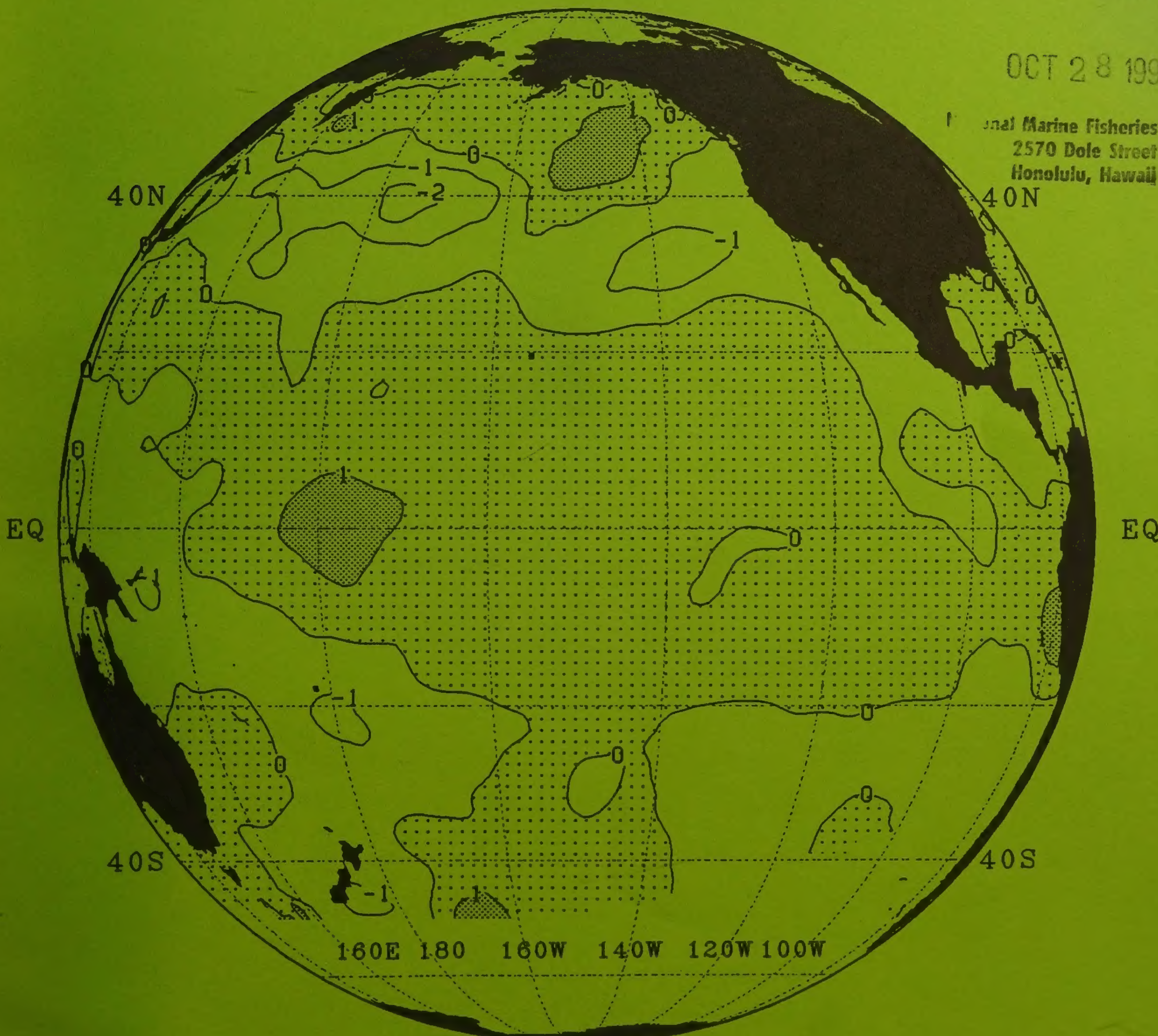
気 象 庁 海 洋 月 報

Monthly Ocean Report

September 1993 (No.9)



El Niño Monitoring Center
Japan Meteorological Agency

気象庁海洋気象部海洋課
エルニーニョ監視センター

平成5年9月

気象庁海洋月報は、気象庁海洋気象部海洋課エルニーニョ監視センターで
作成されています。本月報に関する問い合わせは、
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表紙は1993年9月の太平洋の月平均海面水温偏差図です。
陰影部は平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for September 1993 in the Pacific Ocean. Areas of positive anomalies are shaded.

目　　次

	図	ページ
海況の特徴（1993年9月）		i - ii
137°Eと155°Eに沿う海洋と大気間のメタンの収支	A	iii
全球及び太平洋		
エルニーニョ監視指数	第1表	1-2
1993年9月の海況		
海面水温		
全球月平均海面水温図及び偏差図	1	3
表層水温		
太平洋表層水温（20℃深度）図及び偏差図	2	4
太平洋赤道に沿う表層水温断面図	3	5
海流		
太平洋ブイ流跡図	4	6
海面水位		
太平洋海面水位偏差図（1993年8月）	5	7
海況の推移		
海面水温		
赤道太平洋海面水温偏差時系列図	6	8
赤道に沿う海面水温及び偏差時系列図	7-8	9-10
表層水温		
赤道太平洋表層水温時系列図	9	11
太平洋の赤道に沿う20℃深度時系列図	10	12
海面水位		
太平洋月平均海面水位偏差時系列図	11	13
熱帯の気象		
南方振動指数及び海面気圧偏差時系列図	12	14
月平均上層雲量分布図及び偏差図	13	15
北西太平洋		
旬平均海面水温図及び偏差図	14-16	16-18
月平均海面水温図及び偏差図	17	19
旬平均海面水温平年偏差時系列図	18	20
日本近海表層水温（深さ100m）図	19	21
旬平均海流図	20	22
測点分布図	21	23-24

Table of Contents

	Figure	Page
Highlights (september 1993)		i - ii
Difference of pCH_4 between the ocean and the atmosphere	A	iii
Global and Pacific Ocean		
El Niño Monitoring Indices	Table-1	1-2
Monthly Mean and Anomaly (september 1993)		
Sea Surface Temperature (SST)		
SST and Anomalies in the Global Ocean	1	3
Subsurface Temperature		
Depth of 20℃ and Anomalies in the Pacific Ocean	2	4
Depth-Longitude Section of Temperature along the Equator in the Pacific Ocean	3	5
Ocean Current		
Movements of Drifting Buoys in the Pacific Ocean	4	6
Sea Level		
Sea Level Anomalies in the Pacific Ocean (August 1993)	5	7
Long-term Variations		
Sea Surface Temperature		
Time Series of Equatorial Pacific SST Anomalies	6	8
Time-Longitude Section of SST and Anomalies along the Equator	7-8	9-10
Subsurface Temperature		
Time Series of Equatorial Pacific Subsurface Temperatures	9	11
Time-Longitude Section of Depth of 20℃ Isotherm along the Equator in the Pacific Ocean	10	12
Sea Level		
Time Series of Sea Level Anomalies in the Pacific Ocean	11	13
Atmospheric Conditions in the Tropics		
Time Series of SOI, Tahiti and Darwin's Sea Level Pressure Anomalies	12	14
High-Cloud Amount and Anomalies in the Equatorial Pacific	13	15
Western North Pacific Ocean		
Ten-day Mean SST and Anomalies	14-16	16-18
Monthly Mean SST and Anomalies	17	19
Time Series of Ten-day Mean SST Anomalies	18	20
Subsurface (at the depth of 100m) Temperatures in Seas Adjacent to Japan	19	21
Ten-day Analysis of Sea Surface Current	20	22
Geographical Distribution of Oceanographic Data	21	23-24

海況の特徴（1993年9月）

太平洋の海況

太平洋熱帯域の海面水温は、日付変更線付近では30℃以上の海域が広がり、平年より1℃以上高かった。日付変更線から10°Sに沿って100°W付近まで0.5℃以上高い海域が広がっていた。エルニーニョ監視海域（4°S～4°N，150°W～90°W）の海面水温は、正偏差が続いたが+0.2℃と小さな値であった（第1表、第1図、第6図）。

赤道域の20℃等温線の深度は中部では深まり、東部では浅くなった（第9図）。

北太平洋の海面水温は、日本近海から北米沖まで40°Nに沿って帯状に平年より低い状態が続き、アラスカ湾沖では平年より1℃以上高い状態が続いた（第1図）。

日本近海の海況

日本近海の海面水温は、全般に平年より1℃以上低い状態が続いたが、負偏差の大きさは前月より小さくなり、平年より2℃以上低い海域は、日本海と北海道南部から三陸沖にかけてに限られた。一方、前月まで正偏差が続いていたフィリピン近海から南西諸島にかけての海域はほぼ平年並となった（第17図）。

黒潮は、九州・四国に沿って流れた後、紀伊半島沖から33°Nに沿って東に流れ、中旬までは138°E付近から北東に流れていたが、下旬には140°E付近で北進して房総半島に接岸した後、東に流れていた（第20図）。

本州東方の親潮系の冷水（深さ100mで5℃以下）は、38.8°N・142.7°Eまで南下していた（第19図）。

熱帯の気象

対流活動は日付変更線付近で再び平年より活発となった。一方フィリピン付近でも平年よりやや活発であったが、海洋大陸付近では不活発であった。太平洋赤道域の下層の東西風は日付変更線より西側ではほぼ平年並、東側では西風偏差であった。太平洋熱帯域の地上気圧は東部で負偏差、西部で正偏差の状態が今月も持続し、SOIも-0.7と負の値のままだった（第1表、第12図、第13図）。［気象庁長期予報課提供］

HIGHLIGHTS September 1993

Pacific

Sea surface temperatures (SSTs) at the date line along the equator were around 30°C, and the anomalies exceeded +1°C. SSTs were more than 0.5°C above normal from the date line eastward to 100°W along 10°S. The SST index for region B (refer to Fig.6) remained positive but small value, +0.2°C (Table 1 and Figs.1, 6)

The depth of the 20°C isotherm was deeper (shallower) than previous months in the central (eastern) Pacific (Fig.9).

In the North Pacific Ocean, negative SST anomalies continued from around Japan to off North America along the 40°N. SSTs off the Gulf of Alaska continued to be 1°C above normal (Fig.1).

Seas adjacent to Japan

SSTs in seas adjacent to Japan continued to be more than 1°C below normal, however negative SST anomaly values were smaller than the previous month. SSTs more than 2°C below normal were found only at the Japan sea and from south of Hokkaido to off Sanriku. SSTs in seas around the Philippines and Nansei Islands returned to near normal (Fig.17).

The Kuroshio flowed along the coasts of Kyushu and Shikoku, and flowed eastward along the 33°N parallel. Until the middle of September, it flowed northeastward from 138°E. At the end of September, it flowed northward along 140°E and passed near the Boso Peninsula, then it flowed eastward (Fig.20).

The Oyashio cold water (colder than 5°C at a depth of 100m) extended southward to 38.8°N, 142.7°E (Fig.19).

Atmospheric conditions in the tropics

Convective activities near the date line which weakened in August became stronger than normal again. Those near the Philippines were also slightly stronger than normal, while those near the Maritime Continent were weaker than normal. Low level easterlies over the western and central equatorial Pacific were almost normal, while those over the eastern equatorial Pacific were weaker than normal. Negative sea level pressure anomalies over the eastern tropical Pacific and positive ones over the western tropical Pacific have persisted and the SOI remained negative (-0.7) (Table 1 and Figs.12, 13).

[prepared by the Long-range Forecast Division, JMA]

Difference of pCH_4 between the ocean and the atmosphere

図A　137°Eと155°Eに沿う海洋と大気間のメタンの収支。

気象庁の海洋気象観測船「凌風丸」による1993年の観測によると、この海域は大気中のメタンに対して、冬季も夏季も放出域であることがわかった。

ただし、フラックスは0～2 $\mu gCH_4 m^{-2}h^{-1}$ 程度で湿地や水田の放出量と比べるとかなり小さかった。　（気象庁海洋課汚染分析センター資料）

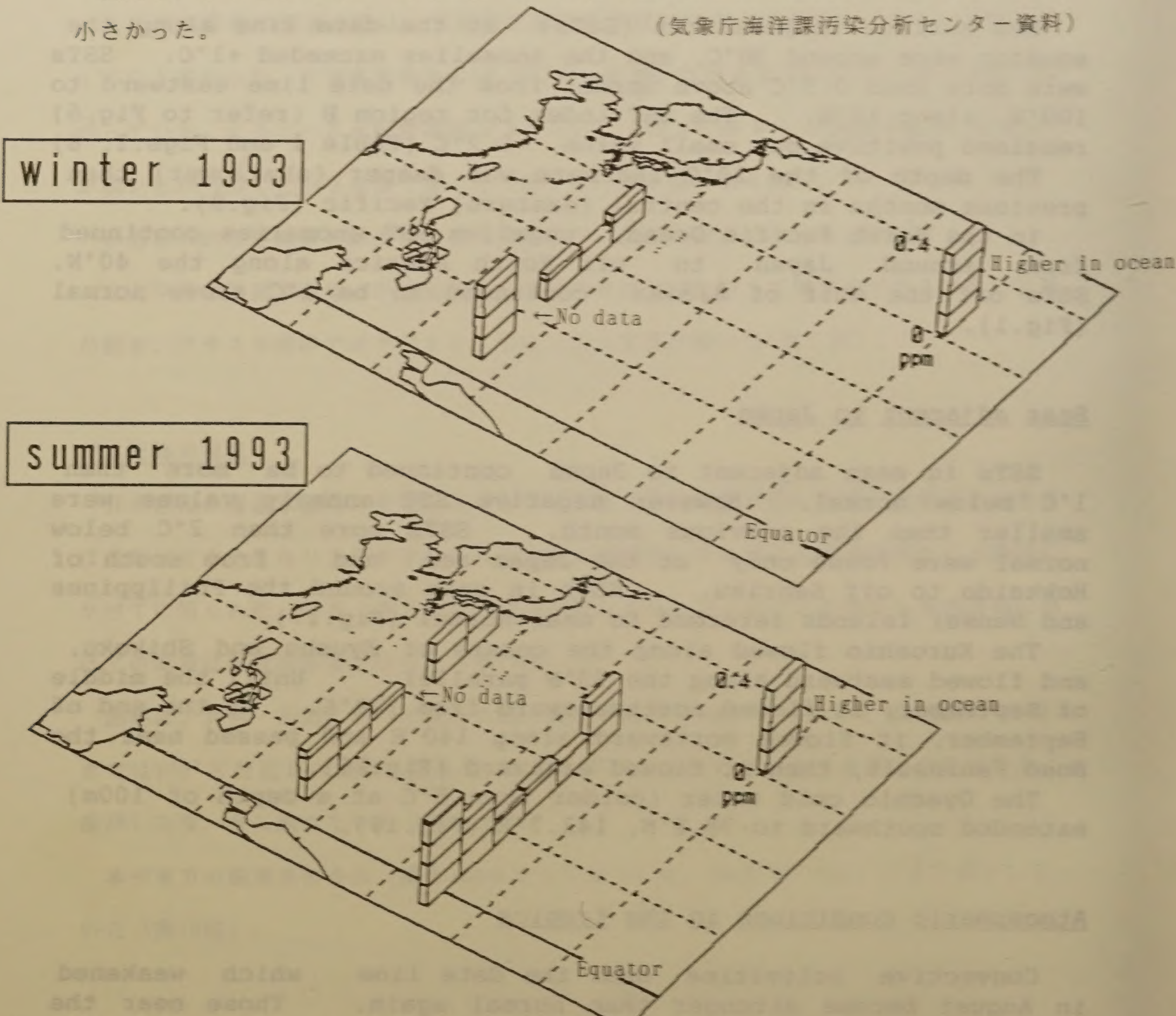


Fig. A

Difference of partial pressure of CH_4 between the ocean and the atmosphere along 137°E and 155°E, observed by R/V Ryofu Maru in winter and summer 1993.

In the western North Pacific, CH_4 was released from the ocean in both winter and summer of 1993. The CH_4 flux from the ocean is about 0 to 2 $\mu gCH_4 m^{-2}h^{-1}$ and is much smaller than those from wetlands and rice paddies.

Further information is available at the Pollutants Chemical Analysis Center, Oceanographical Division, JMA.

Date	1992 APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1993 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Pacific Sea Surface Temperature (℃)																		
D (14N~ Eq.) (130E~150E)	28.7 -0.1	29.1 0.0	29.4 +0.1	29.1 -0.1	29.1 0.0	29.2 0.0	29.5 +0.2	29.0 -0.2	28.7 -0.2	28.0 -0.5	28.0 -0.3	28.2 -0.2	28.6 -0.2	28.8 -0.3	29.2 -0.1	29.1 -0.1	28.9 -0.2	29.1 -0.1
A (4N~ 4S) (160E~150W)	29.2 +1.0	29.4 +0.9	29.2 +0.7	29.2 +0.7	29.1 +0.7	28.8 +0.5	28.8 +0.4	28.7 +0.3	28.8 +0.6	28.5 +0.5	28.4 +0.4	28.4 +0.3	28.7 +0.5	29.0 +0.5	29.1 +0.6	29.1 +0.6	28.8 +0.4	29.1 +0.8
B (4N~ 4S) (150W~ 90W)	28.5 +1.4	28.3 +1.7	26.9 +0.8	25.6 +0.4	24.6 0.0	24.5 -0.1	24.6 0.0	24.7 +0.1	25.0 +0.1	25.5 +0.1	26.6 +0.4	27.4 +0.5	28.1 +1.0	28.0 +1.4	27.0 +0.9	25.8 +0.6	24.9 +0.3	24.8 +0.2
C (Eq.~ 10S) (90W~ 80W)	28.0 +2.9	26.4 +2.5	23.7 +1.0	21.6 0.0	20.5 -0.1	20.2 -0.1	20.8 +0.1	21.2 -0.3	22.5 -0.1	24.3 0.0	26.1 +0.4	27.0 +1.1	26.4 +1.3	25.2 +1.3	23.3 +0.6	22.1 +0.5	21.0 +0.4	20.8 +0.5
Pacific Sea Level Anomaly (cm)																		
YAP (10N,138E)	1	6	5	-2	-3	2	9	6	8	7	9	11	1	-2	-2	1	-1	
RABAUL (4S,152E)	-18	-20	-18	-13	-11	-10	-6	-6	-6	-9	-10	-14	-12	-13	-11	-8	-9	
MAJURO (7N,171E)	0	-2	4	7	7	11	15	6	4	-1	-4	-4	-8	-1	6	5	3	
TARAWA (1N,173E)	-7	-2	-2	2	3	5	2	2	4	1	7	10	3	5	6	4	7	
CHRISTMAS (2N,157W)	7	5	-3	-2	-7	-4	-3	4	1	5	4	8	6	5	-1	-2	-1	
SANTA CRUZ (1S, 90W)	8	4	-4	-1	-1	-3	-1	-1	-2	4	8	7	7	10	4	0	0	

第１表 (a) エルニーニョ監視指数

Table 1(a) El Niño monitoring indices. Data sources are the El Niño Monitoring Center, JMA for the sea surface temperature and the SOC of ISLP-PAC, Dept. of Oceanography, University of Hawaii for the sea level anomaly.

Date	1992									1993								
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Southern Oscillation Index (Unit of pressure anomalies at Tahiti and Darwin : hPa)																		
SOI (TAHITI-DARWIN)	-1.6	-0.1	-1.3	-0.5	0.1	-0.0	-2.0	-0.6	-0.5	-0.8	-0.6	-0.5	-1.9	-0.8	-1.6	-1.0	-1.5	-0.7
TAHITI (17.5S , 150W)	-0.8	0.0	-1.6	0.7	0.1	-0.8	-2.3	-0.5	-1.1	-1.4	-1.9	1.0	-0.7	0.2	-0.6	-1.1	0.0	-0.0
DARWIN (12.5S , 131E)	1.4	0.1	-0.1	1.6	-0.1	-0.8	0.5	0.6	-0.2	0.4	-0.3	2.4	1.9	1.4	1.3	0.4	2.2	1.4
High Cloud Amount Index																		
HCLD-PH (20N ~ 10N) (110E ~ 140E)	-1.0	-1.5	-1.1	-0.3	0.2	-1.6	0.9	-1.7	-1.4	-1.0	-0.3	-0.4	-0.5	-2.2	-1.9	-0.5	-0.4	0.7
HCLD-MC (5N ~ 5S) (110E ~ 135E)	-1.0	-1.0	-0.7	-0.5	-1.2	-0.4	0.6	-0.8	0.4	-1.1	-0.9	-1.1	0.3	-1.4	-2.1	-1.0	-1.4	-1.0
HCLD-DL (5N ~ 5S) (170E ~ 170W)	2.3	2.0	1.7	0.0	0.1	-0.6	-0.1	1.3	1.2	0.8	1.4	0.5	2.8	2.0	1.8	1.3	0.3	1.8
Equatorial Zonal Wind Index																		
U200-IN (5N ~ 5S) (80E ~ 100E)	0.1	0.6	0.2	-0.4	-0.4	-1.1	-1.4	0.1	0.1	-0.1	0.8	-0.9	-0.3	0.5	0.4	-0.3	-0.5	-2.1
U200-CP (5N ~ 5S) (180 ~ 125W)	-0.9	-1.1	-0.1	0.0	1.1	-0.4	0.7	-0.2	0.7	-0.3	-0.3	0.0	-0.6	-1.3	-0.0	1.1	0.3	-0.3
U850-WP (5N ~ 5S) (160E ~ 175W)	0.9	0.6	0.1	0.1	-0.4	0.2	0.2	0.4	0.8	0.3	0.9	0.3	0.8	0.5	0.3	0.1	0.7	-0.0
U850-CP (5N ~ 5S) (170W ~ 135W)	0.8	0.9	0.1	0.3	-0.7	0.5	-0.4	0.9	0.2	0.2	0.0	-0.1	0.3	0.6	0.6	-0.8	0.1	0.2
U850-EP (5N ~ 5S) (130W ~ 100W)	0.2	0.5	0.4	-0.1	-0.9	0.6	-1.2	1.9	-0.0	0.1	-0.1	0.2	0.5	0.9	0.7	-0.4	0.8	1.0

第1表 (b) エルニーニョ監視指数(続き)

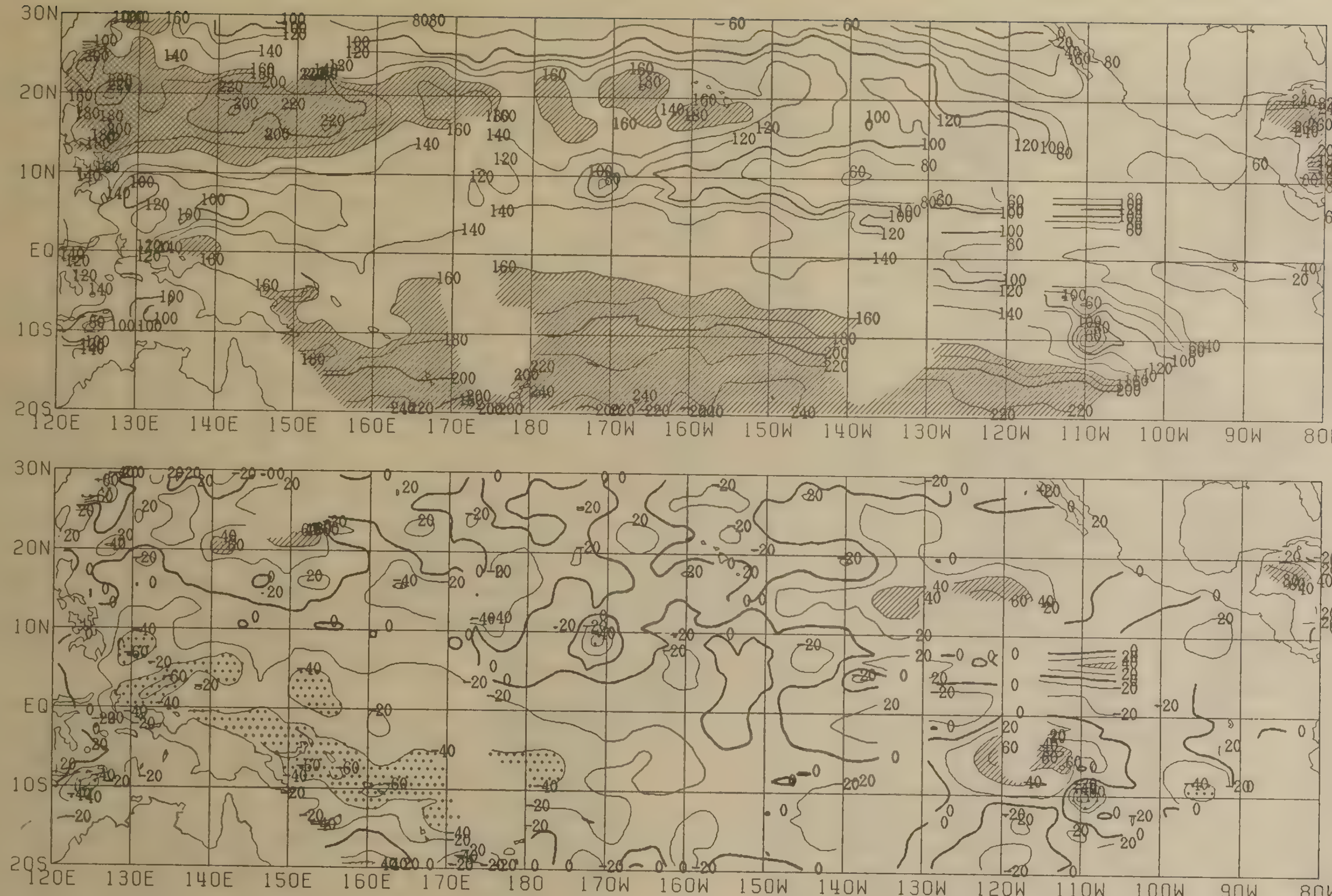
Table 1(b) El Niño monitoring indices (continued) .

Data source for these atmospheric conditions is the Long-range Forecast Division, JMA.

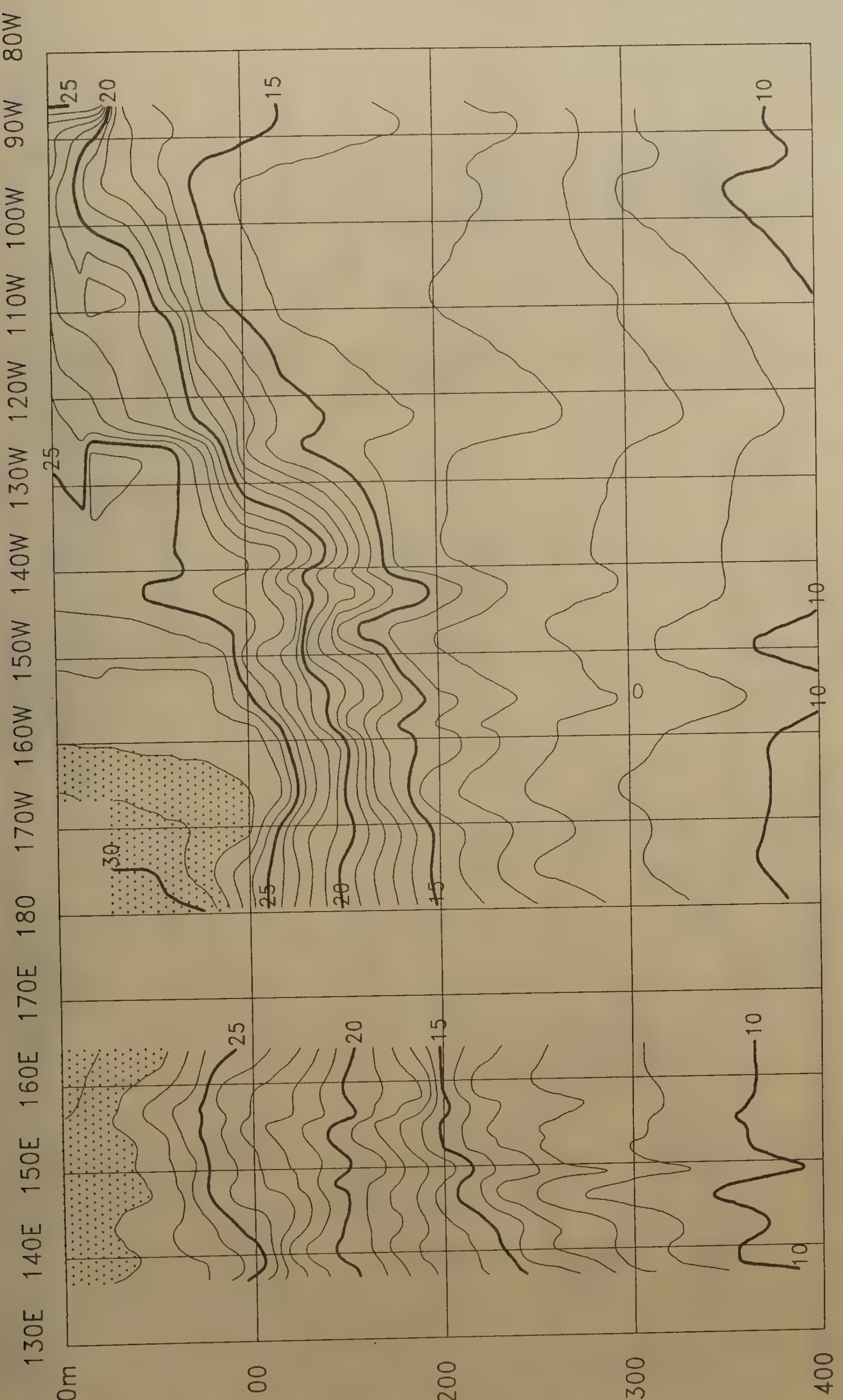


第1図　全球月平均海面水温図（上）及び偏差図（下）（1993年 9月）

Fig.1 Monthly mean sea surface temperature in the global ocean (top) and anomalies (bottom) for SEP 1993. Anomalies are computed with respect to the JMA climatology (1961–90) (Climatic charts of sea surface temperatures of the western North Pacific and the global ocean, March 1991). The Contour interval is 1°C and additional anomaly contours of ±0.5°C are shown as broken lines. Negative anomalies are stippled.

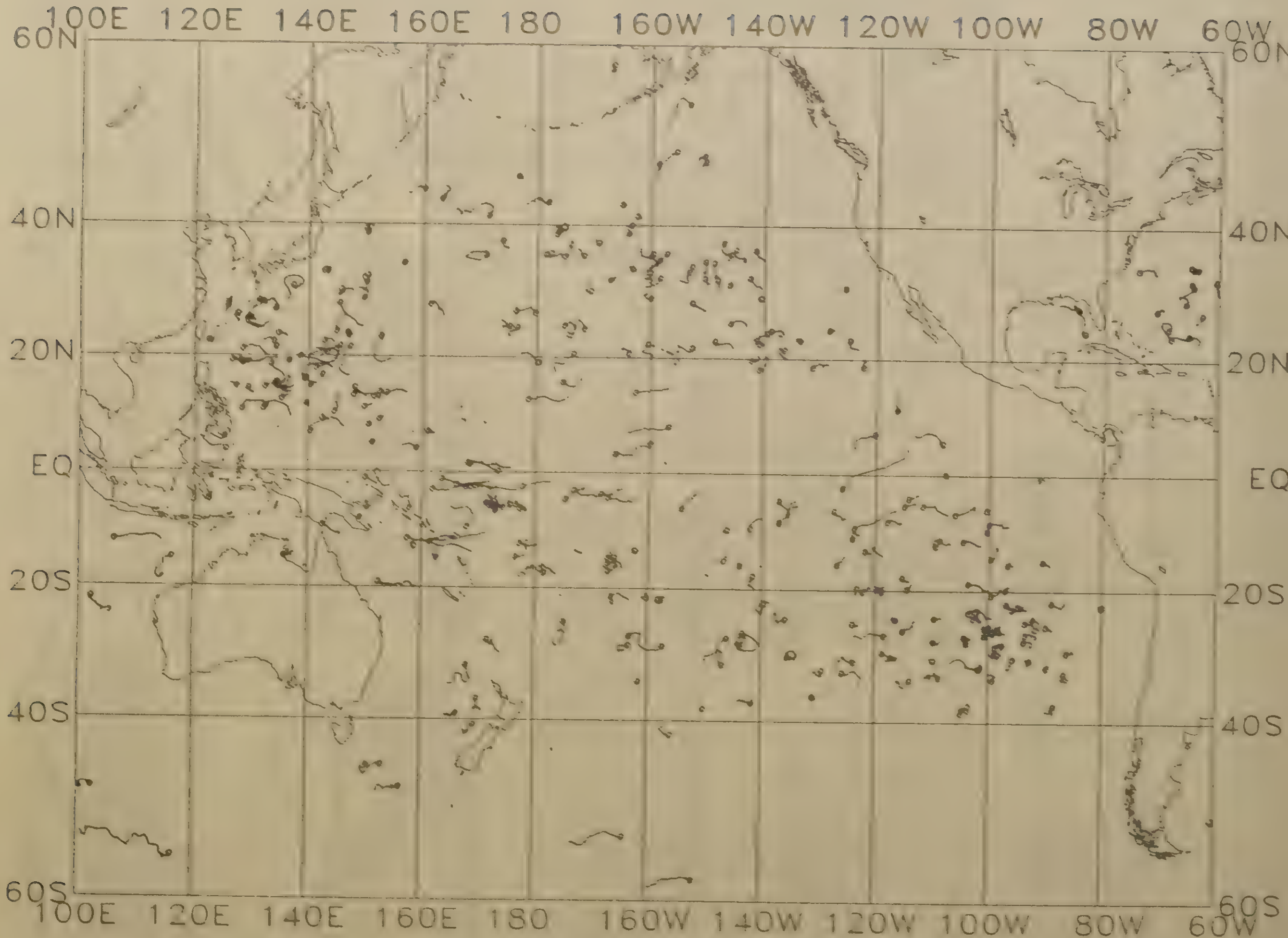


第２図　太平洋表層水温（20℃深度）図（上）及び偏差図（下）（1993年 9月）
Fig.2　The depth of a 20° C isotherm in the Pacific Ocean (top) and anomalies (bottom) for SEP 1993. Anomalies are computed with respect to the climatology (Levitus, 1982, Climatological Atlas of the World Ocean, NOAA).
The contour interval is 20m with shading for values greater than 160m (top), and shading/stippling for values greater/smaller than +40m/−40m (bottom).



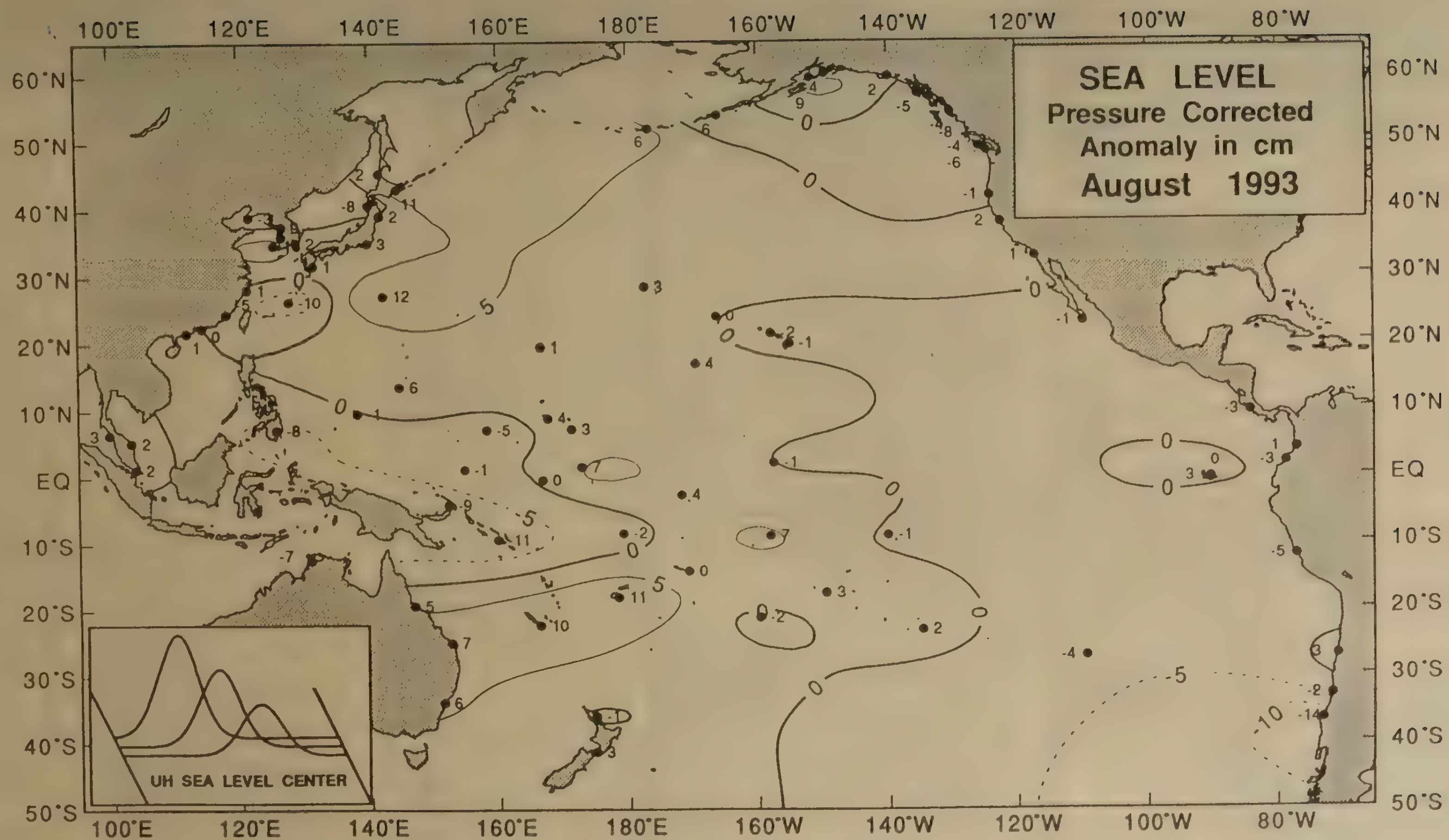
第３図　太平洋赤道に沿う表層水温断面図（1993年 9月）

Fig.3　Depth−longitude section of the Pacific Ocean temperature along the equator for SEP 1993.　The contour interval is 1° C with spotted shading for values greater than 28° C.



第4図　太平洋ブイ流跡図(1993年 9月)

Fig.4 Movements of drifting buoys in the Pacific Ocean during SEP 1993. Each track is one buoy, with the small circle representing the buoy's last position for the month.

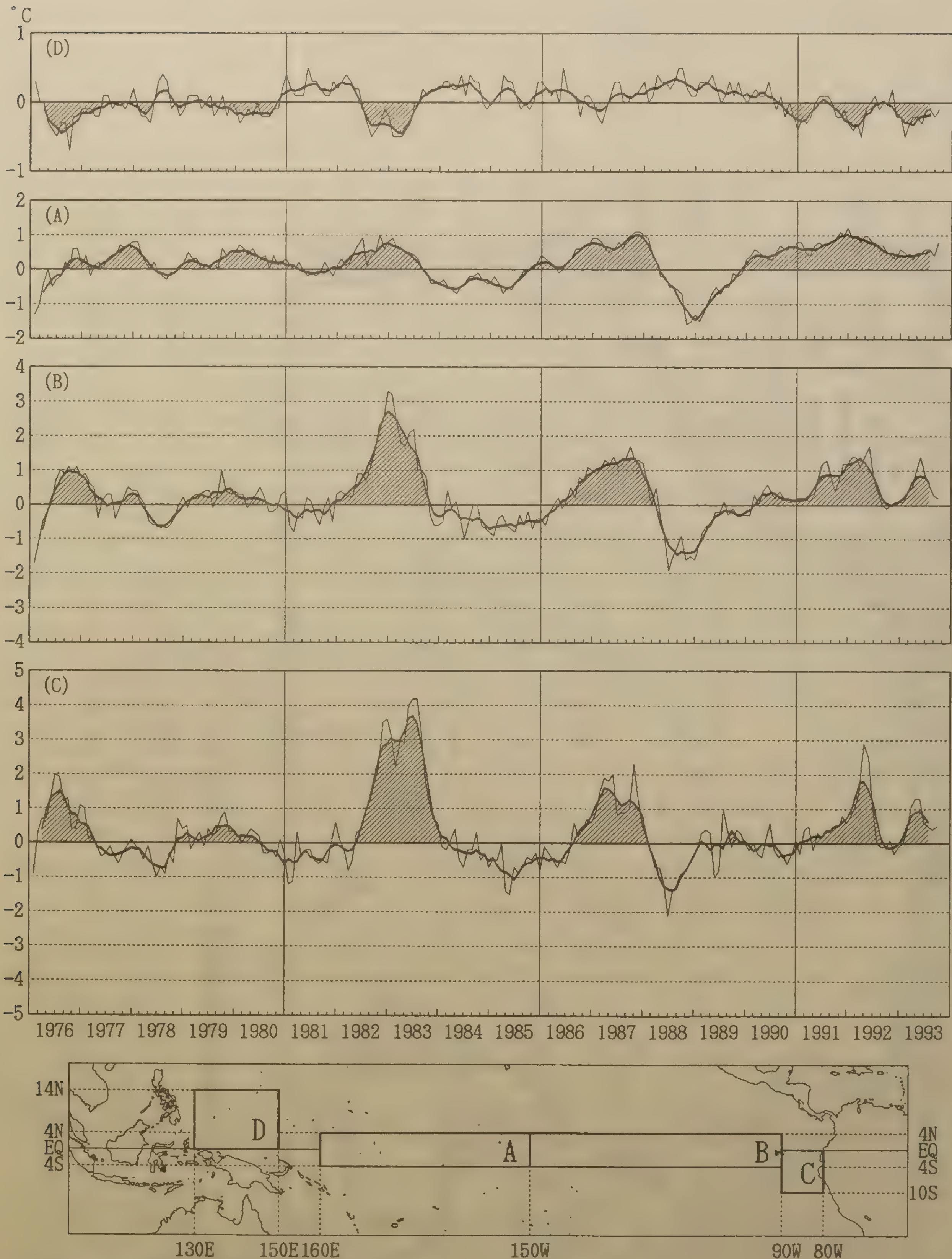


第5図　太平洋海面水位偏差図（ 1993年 8月 ）

Fig.5 Sea level anomalies obtained from the 1975 to 1986 mean AUG sea level adjusted for atmospheric pressure (AUG 1993).

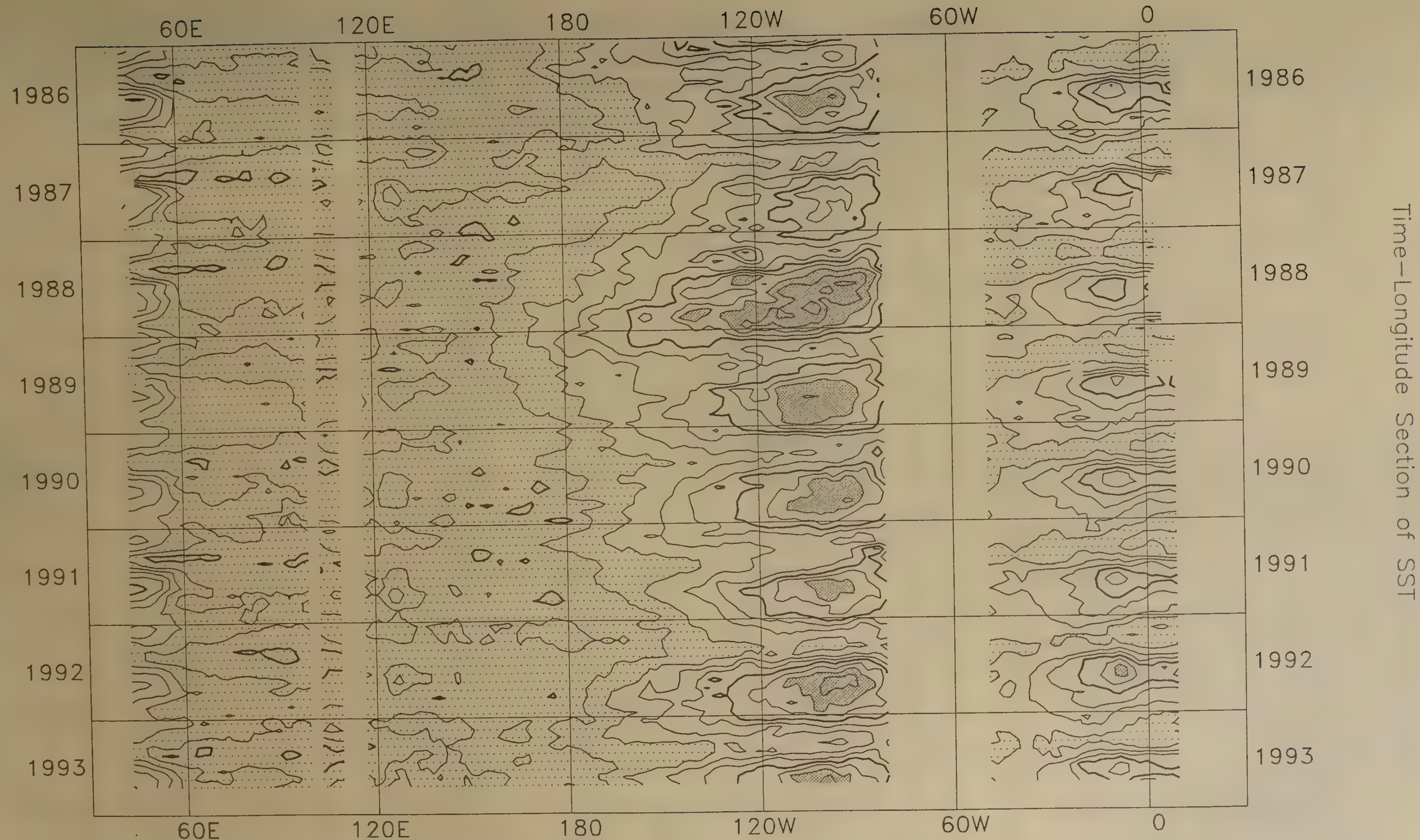
This figure is prepared by the SOC of ISLP−PAC, Dept. of Oceanography, Univ. of Hawaii.

Time Series of Equatorial Pacific SST Anomalies



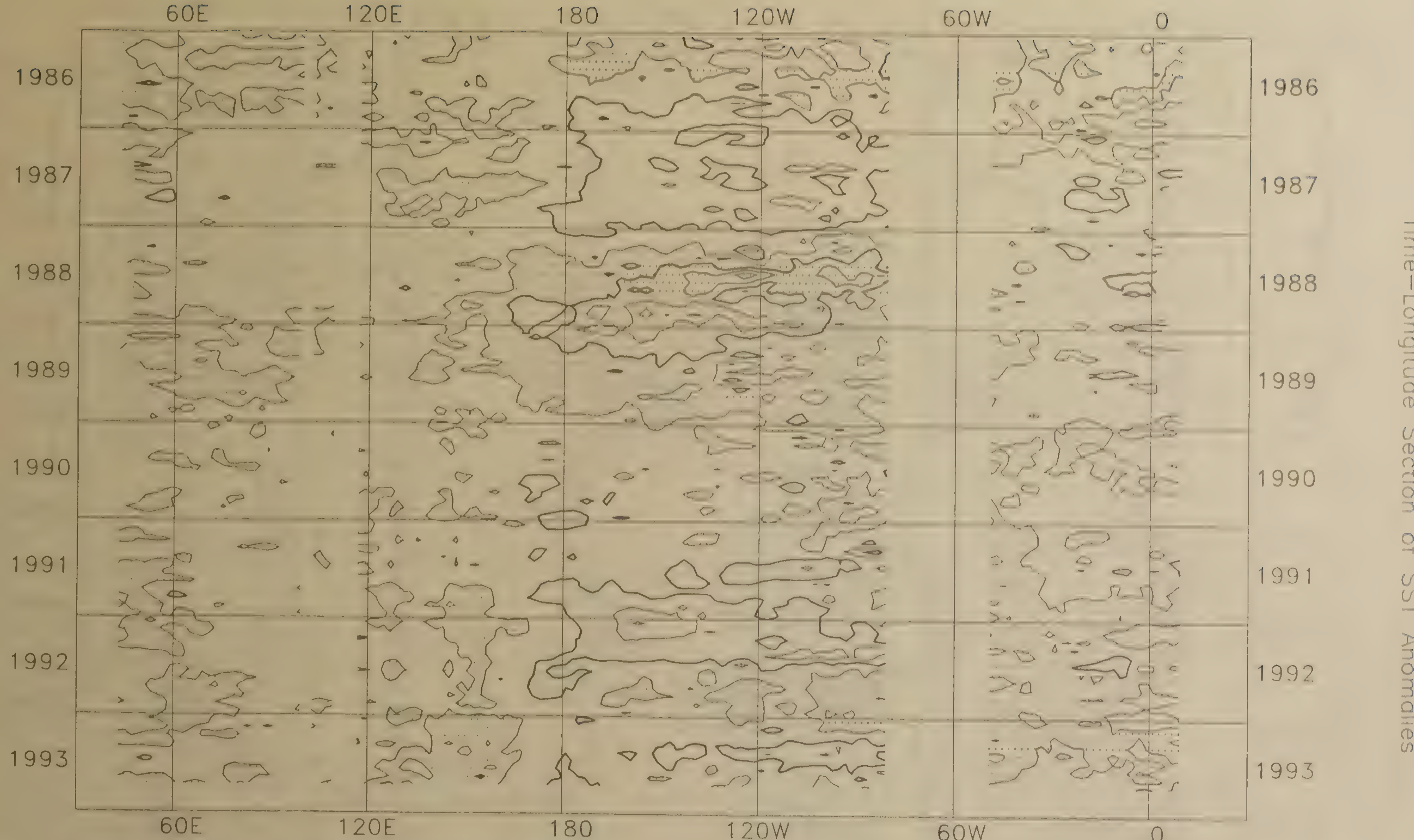
第６図　赤道太平洋海面水温偏差時系列図

Fig.6 Time series of monthly mean SST anomalies in the equotorial Pacific Ocean for the areas indicated at the bottom of the figure. Thin lines show the monthly values and thick lines their 5 month running mean. Positve anomalies (A,B,C) and negative anomalies (D) are shaded. Anomalies are computed with respect to the JMA climatology (1961–90).



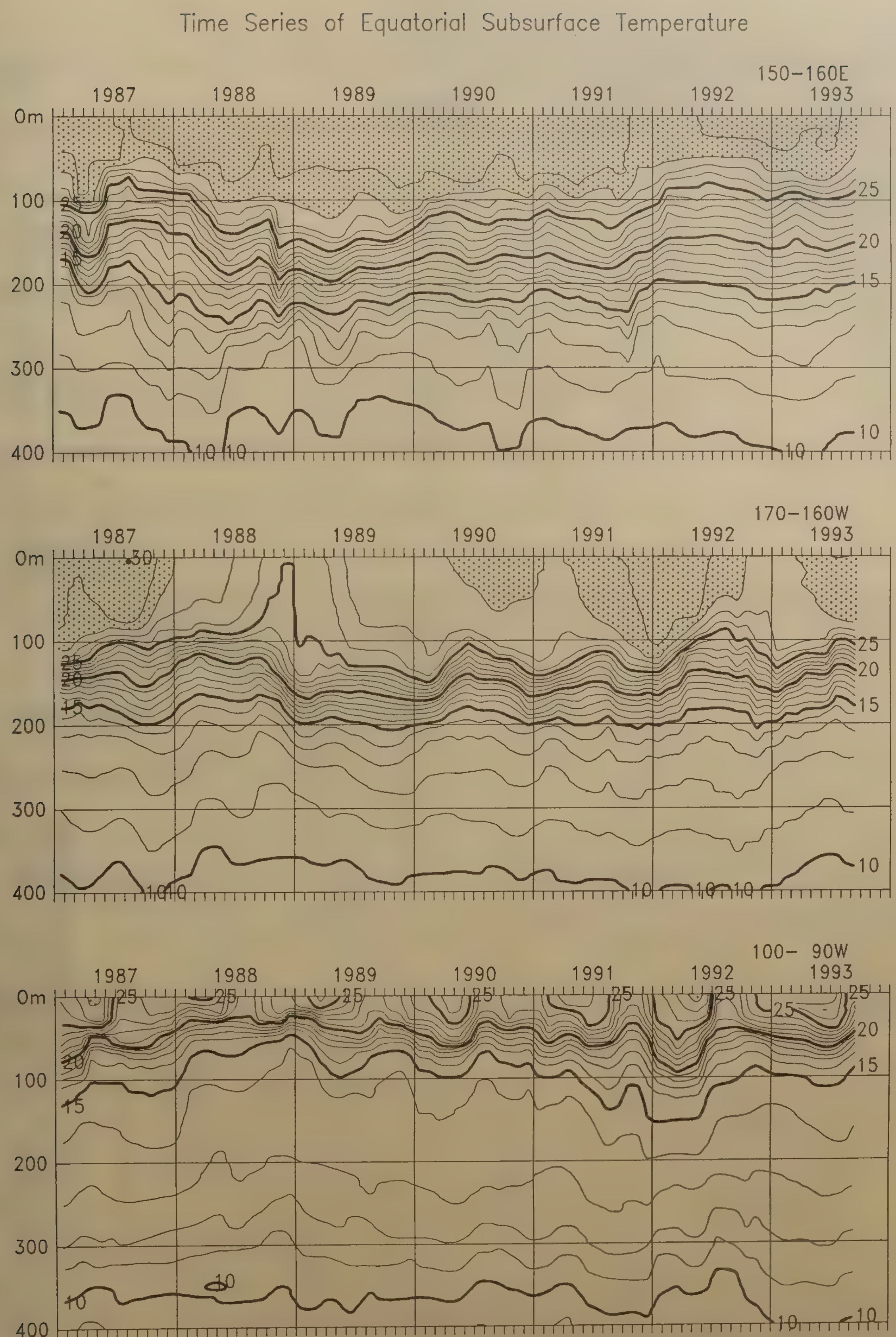
第7図　赤道に沿う海面水温時系列図

Fig.7 Time-longitude section of SSTs along the equator (2° N–2° S) in the global ocean. The contour interval is 1° C, with thick contour lines at 25 and 30° C. SST values greater than 28° C are spotted and values less than 23° C are shaded.



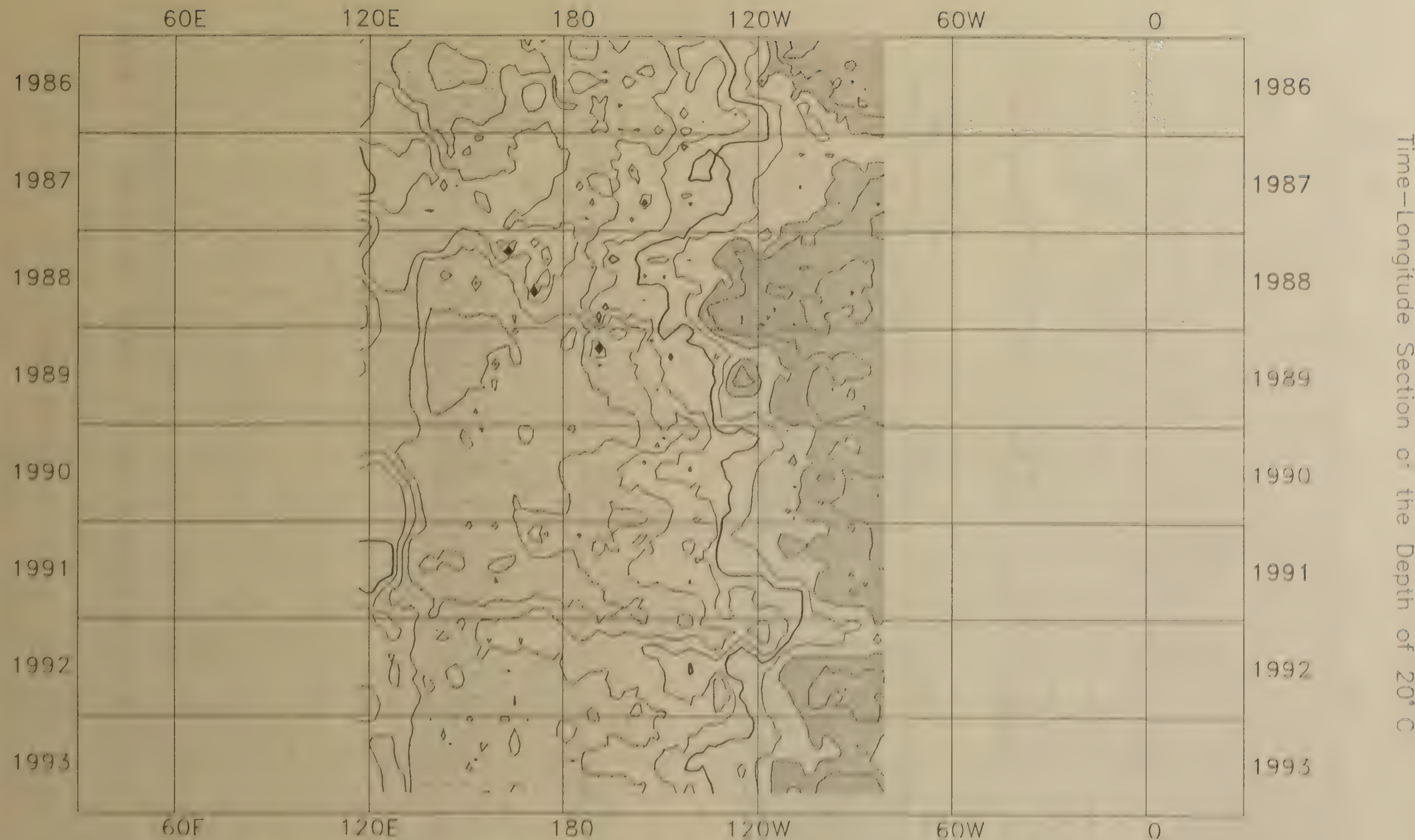
第8図　赤道に沿う海面水温偏差時系列図

Fig.8 Time-longitude section of SST anomalies along the equator (2° N–2° S) based on the JMA climatology (1961–1990). The contour interval is 1° C, with thick contour lines at +1° C and −1° C. Negative anomalies are spotted.



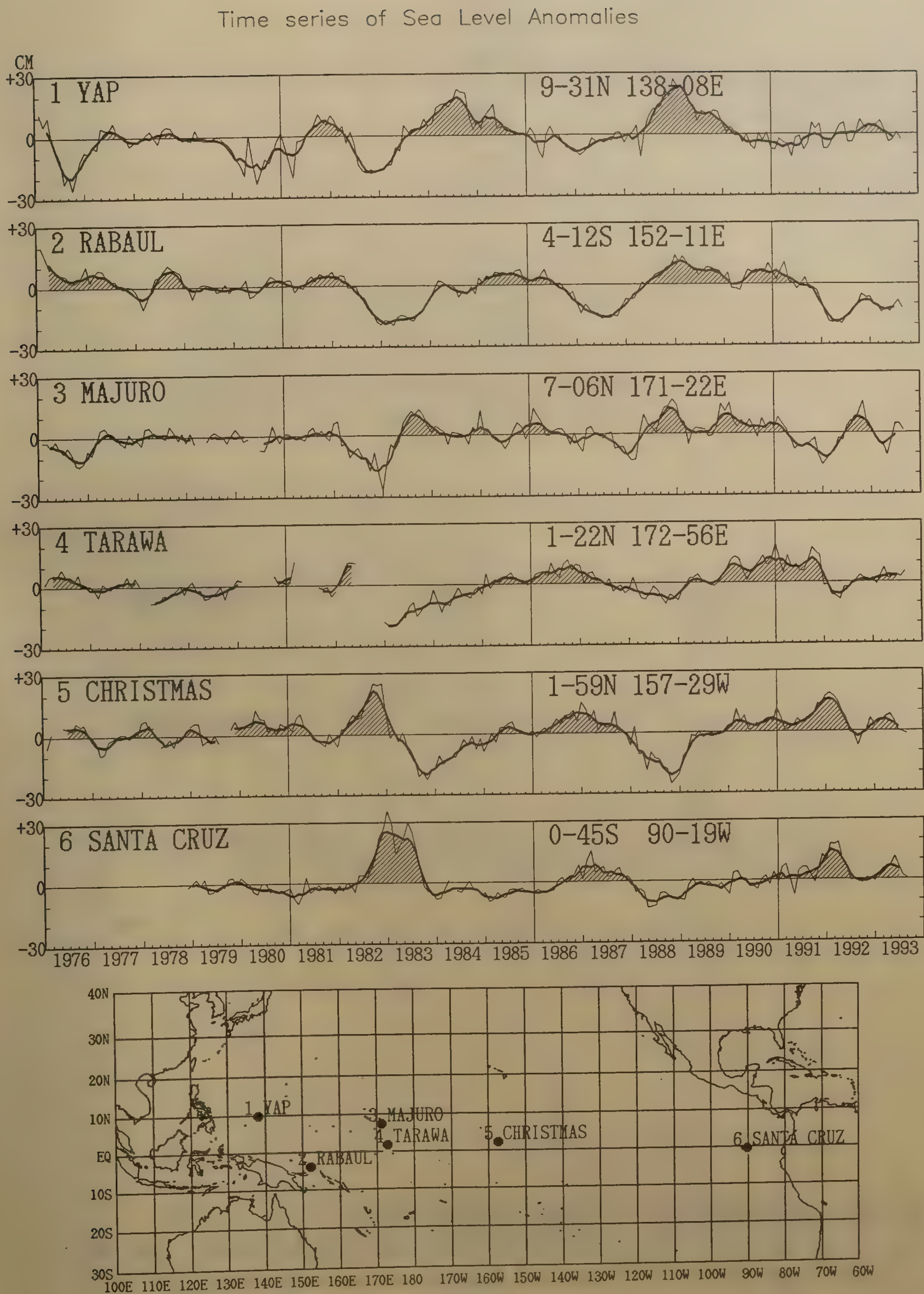
第９図　赤道太平洋表層水温時系列図（上：西部、中：中部、下：東部）

Fig.9 Time series of equatorial (2° N–2° S) subsurface temperature for the western Pacific (top, 150–160° E), the central Pacific (middle, 170–160° W) and the eastern Pacific (bottom, 100–90° W). The contour interval is 1° C with spotted shading for the values greater than 28° C.



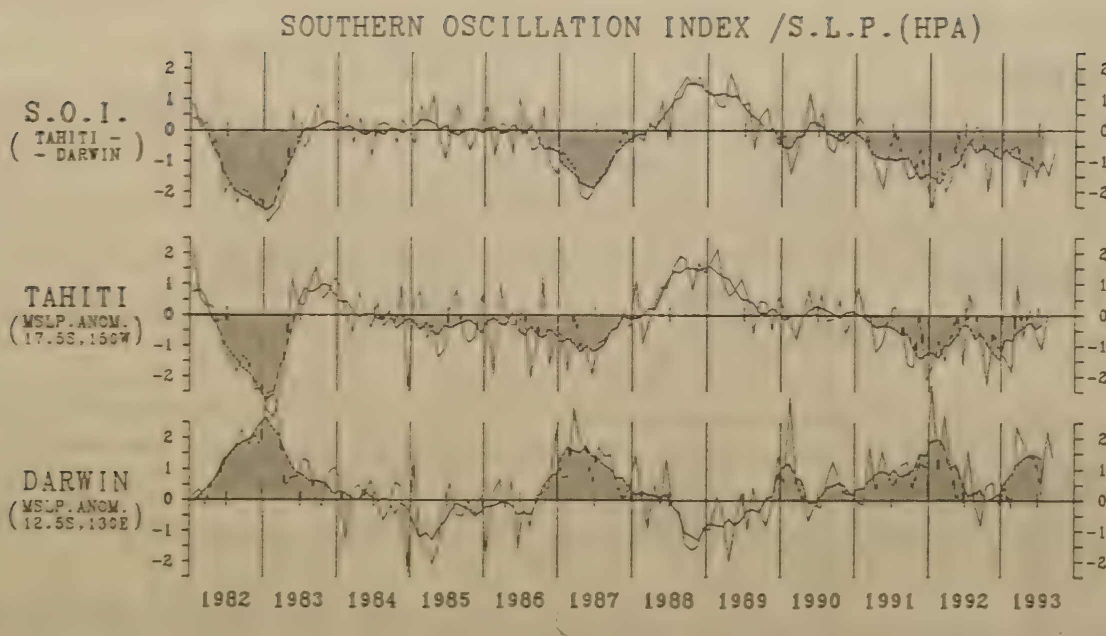
第10図　太平洋の赤道に沿う20℃深度時系列図

Fig.10 Time longitude section of the depth of a 20° C isotherm along the equator in the Pacific Ocean. The contour interval is 20m with thick contour lines at 100m. Values shallower than 60m are shaded and those deeper than 140m are stippled.



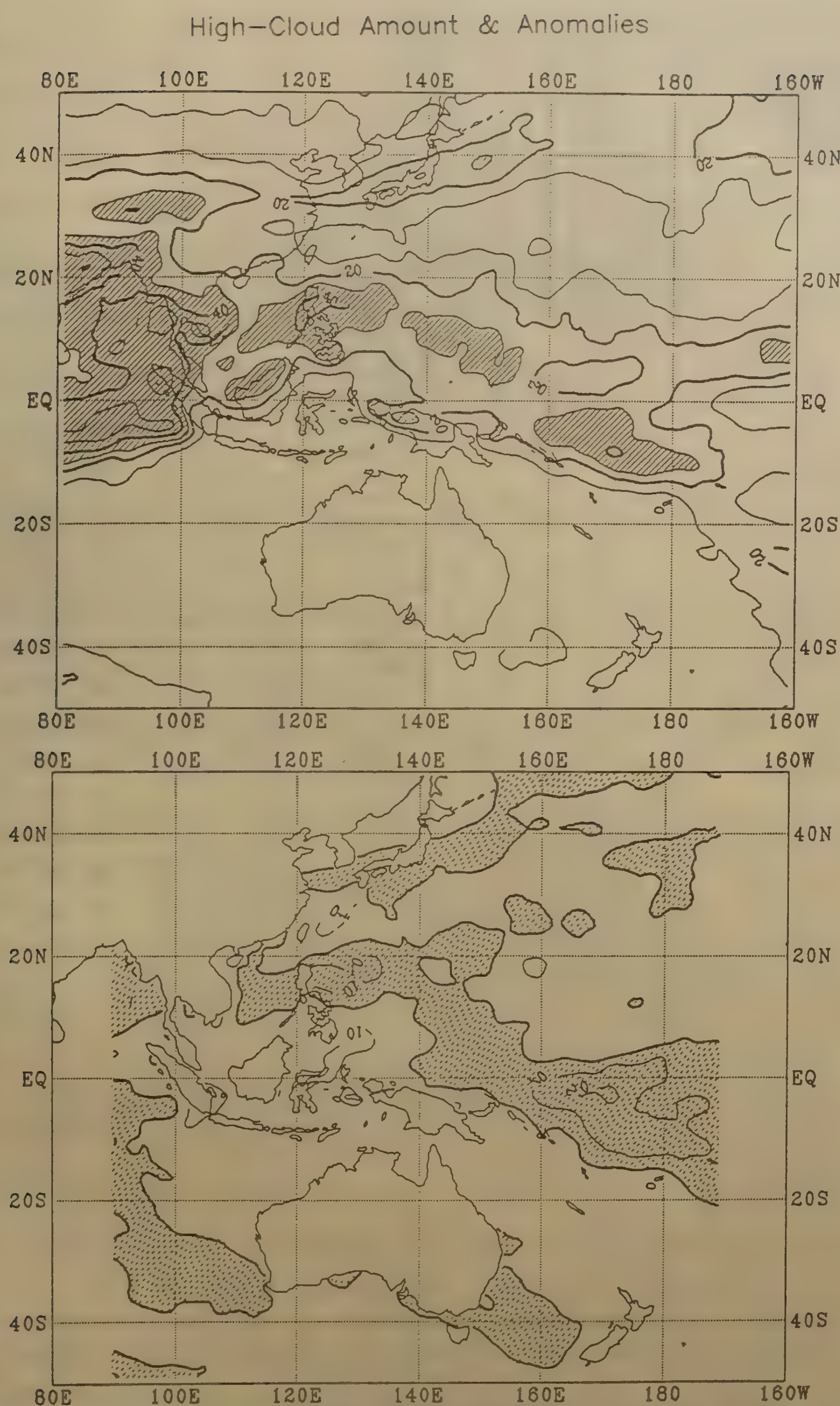
第11図　太平洋月平均海面水位偏差時系列図
Fig.11 Time series of sea level anomalies based on 1976 to 1990 monthly mean sea level obtained from the stations indicated at the bottom of the figure. Thin lines show the monthly mean and thick lines show their 5 month running mean. Positive anomalies are shaded.

Time series of SOI & Sea Level Pressure Standardized Anomalies



第12図　南方振動指数及び海面気圧偏差時系列図

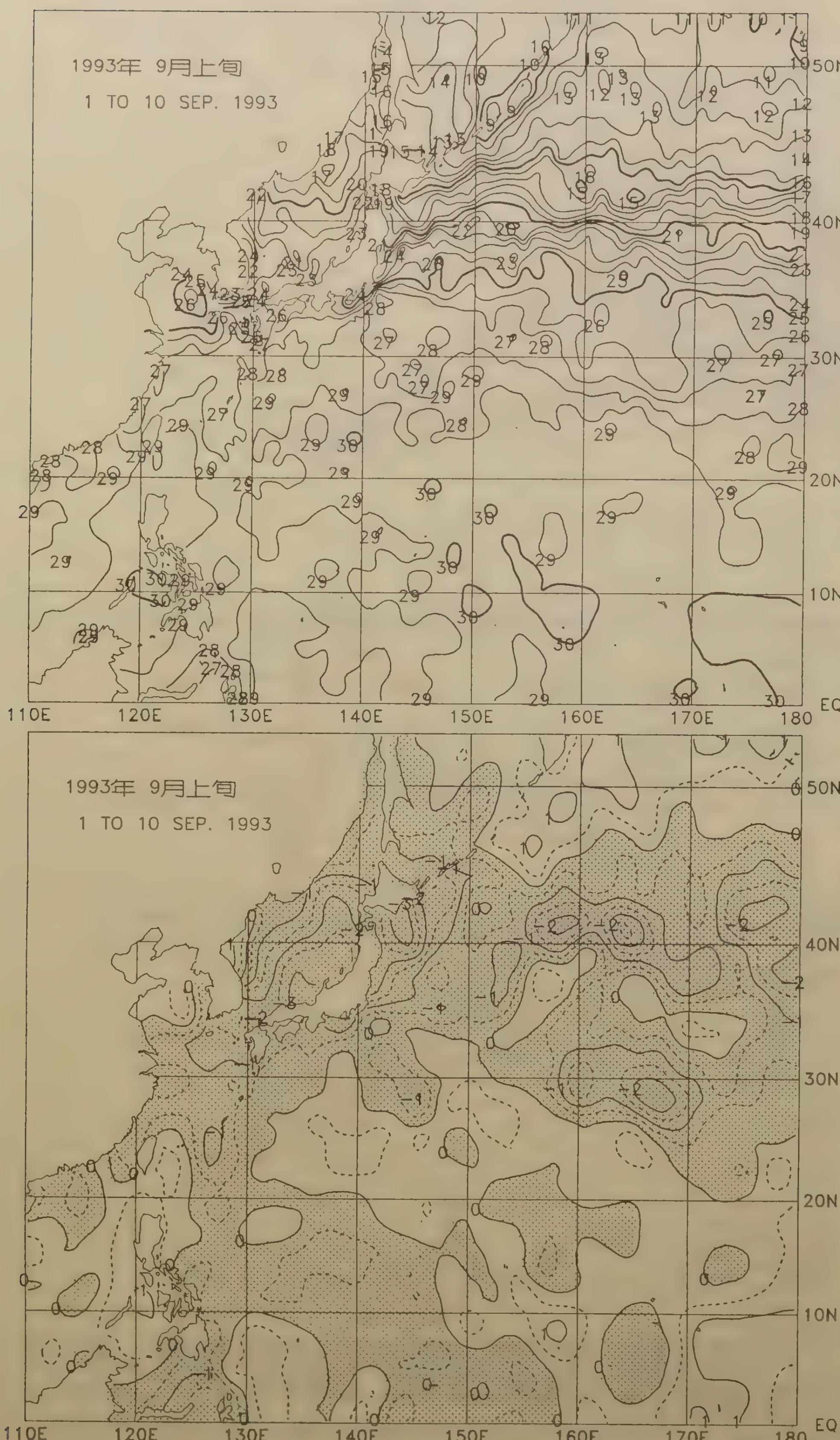
Fig.12 The Southern Oscillation Index (top) and monthly mean sea level pressure standardized anomalies at Tahiti (middle) and Darwin (bottom). Thin lines show the monthly mean and thick lines their 5 month running mean. Negative values (top, middle) and positive values (bottom) are shaded. Base periods for normals and standard deviations are 1961−1990. This figure is prepared by the Long−range Forecast Division, JMA.



第13図　月平均上層雲量分布図及び偏差図（1993年 9月）

Fig.13 Monthly mean of the high-cloud amount (%, top) and its anomalies (%, bottom) in the equatorial Pacific for SEP 1993. The contour interval is 10%. Areas above 30% are shaded (top) and positive anomalies are stippled (bottom). Anomalies represent a departure from the 1978-1990 base period monthly means. This figure is prepared by the Long-range Forecast Division, JMA.

Ten-day mean SST & Anomalies



旬平均沿岸水温(℃)
Coastal Water Temperature

地名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島(47918)	28.5	−0.3
那　覇(47936)	27.5	−0.3
名　瀬(47909)	26.9	−
足摺岬(47898)	26.4	−0.6
潮　岬(47778)	26.8	−
御前崎(47655)	23.9	−1.9
八丈島(47678)	27.6	+0.7
館　山(47672)	23.4	−1.1
小名浜(47598)	21.2	−1.1
宮　古(47585)	19.1	−0.9
浦　河(47426)	16.1	−2.4
紋　別(47435)	19.0	−
稚　内(47401)	19.1	−
寿　都(47421)	19.6	−
江　差(47428)	20.9	−
飛　島(47587)	22.3	−2.5
輪　島(47600)	22.1	−3.5
西　郷(47740)	−	−
浜　田(47755)	23.7	−
厳　原(47800)	25.1	−
牛　深(47838)	24.6	−

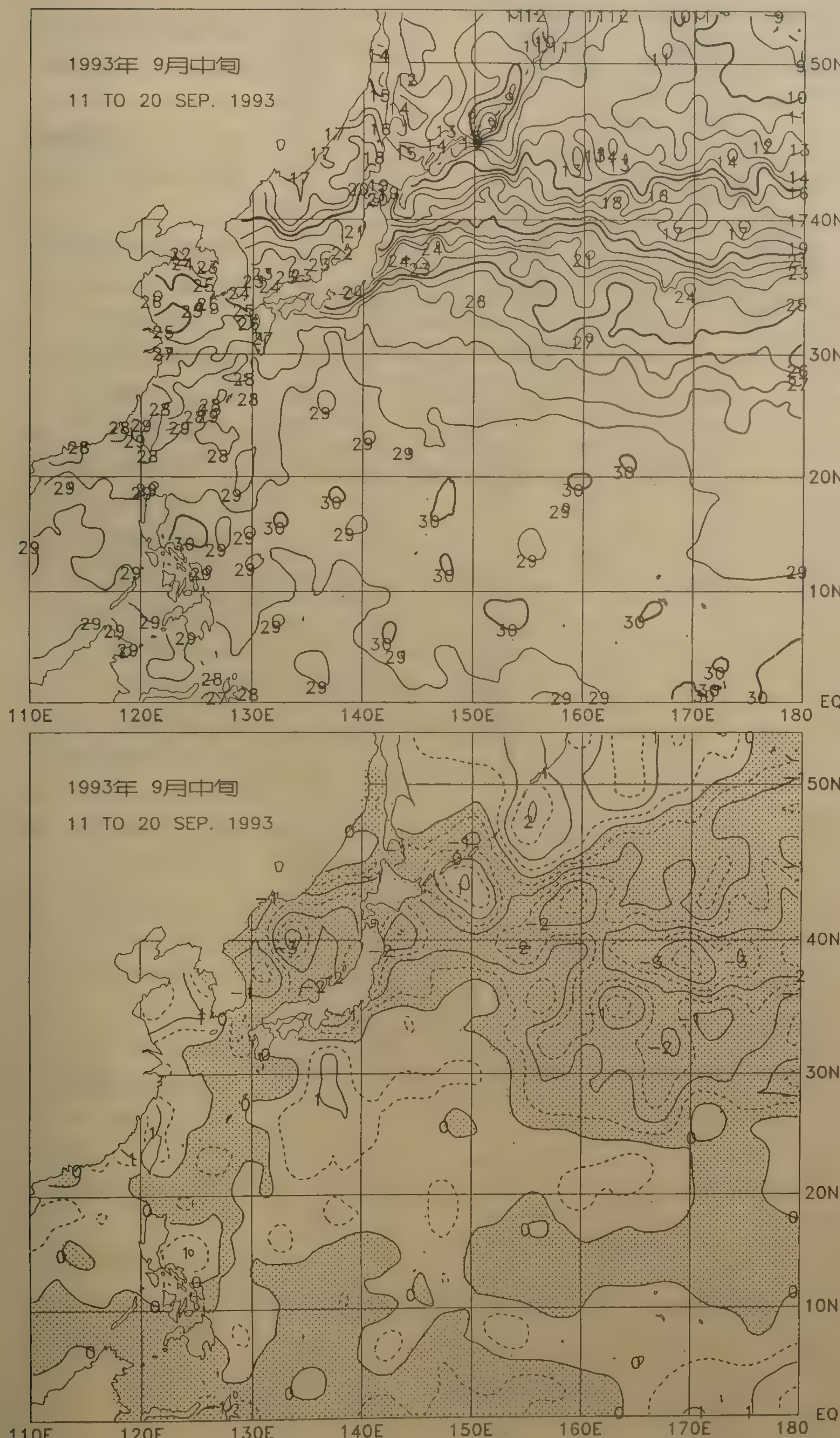
海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,145.4E	21.6
四国沖	29.0N,135.0E	28.7
東シナ海	28.2N,126.3E	28.2

第14図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 9月上旬)

Fig.14 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 1st ten-day period in SEP 1993. Anomalies are computed with respect to the JMA climatology (1961−90). The contour interval is 1°C and additional anomaly contours of 0.5°C are shown. Negative anomalies are stippled.

Ten-day mean SST & Anomalies



旬平均沿岸水温(℃)
Coastal Water Temperature

地名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島(47918)	29.0	+0.6
那　覇(47936)	27.8	−0.5
名　瀬(47909)	27.6	−
足摺岬(47898)	26.4	+0.1
潮　岬(47778)	26.3	−
御前崎(47655)	24.0	−0.7
八丈島(47678)	27.0	+0.5
館　山(47672)	23.7	−0.3
小名浜(47598)	20.9	−1.0
宮　古(47585)	18.8	−1.2
浦　河(47426)	17.9	−0.6
紋　別(47435)	18.6	−
稚　内(47401)	18.7	−
寿　都(47421)	19.4	−
江　差(47428)	20.0	−
飛　島(47587)	21.4	−2.3
輪　島(47600)	21.8	−2.3
西　郷(47740)	23.1	−
浜　田(47755)	23.9	−
厳　原(47800)	24.1	−
牛　深(47838)	25.4	−

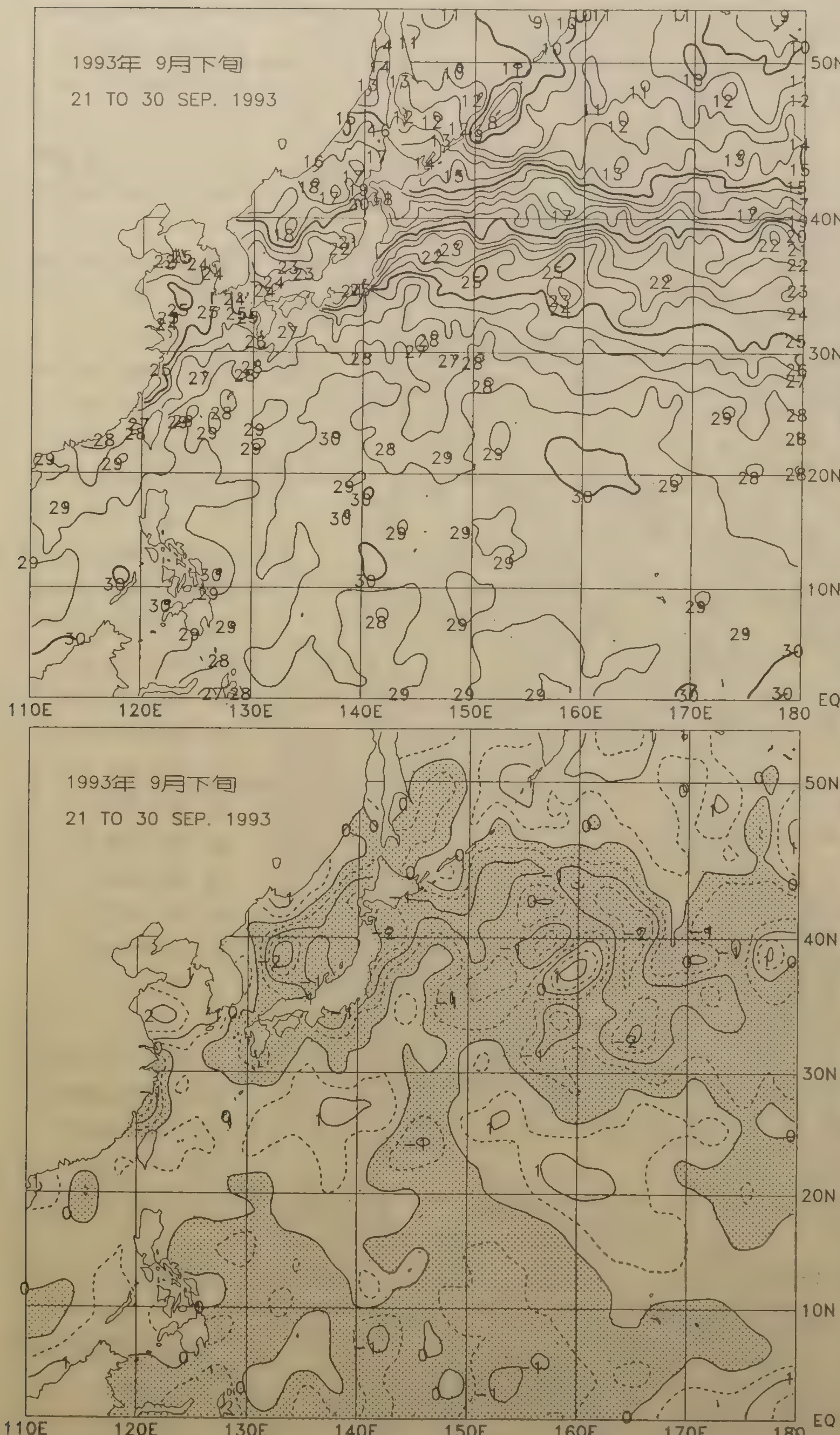
海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

地点	位置	SST
日本海	37.9N,145.4E	21.2
四国沖	29.0N,135.0E	28.6
東シナ海	28.2N,126.3E	28.3

第15図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 9月中旬)

Fig.15 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 2nd ten-day period in SEP 1993. Anomalies are computed with respect to the JMA climatology (1961−90). The contour interval is 1° C and additional anomaly contours of 0.5° C are shown. Negative anomalies are stippled.

Ten-day mean SST & Anomalies



旬平均沿岸水温(℃)
Coastal Water Temperature

地 名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島(47918)	29.0	+1.1
那 覇(47936)	28.1	+0.2
名 瀬(47909)	27.4	-
足摺岬(47898)	25.3	-0.3
潮 岬(47778)	25.4	-
御前崎(47655)	22.7	-0.8
八丈島(47678)	23.8	-2.1
館 山(47672)	23.1	-0.2
小名浜(47598)	20.3	-1.2
宮 古(47585)	18.6	-1.0
浦 河(47426)	16.0	-1.2
紋 別(47435)	17.6	-
稚 内(47401)	17.4	-
寿 都(47421)	18.5	-
江 差(47428)	19.0	-
飛 島(47587)	21.0	-1.5
輪 島(47600)	21.8	-0.8
西 郷(47740)	23.1	-
浜 田(47755)	24.0	-
厳 原(47800)	24.2	-
牛 深(47838)	24.6	-

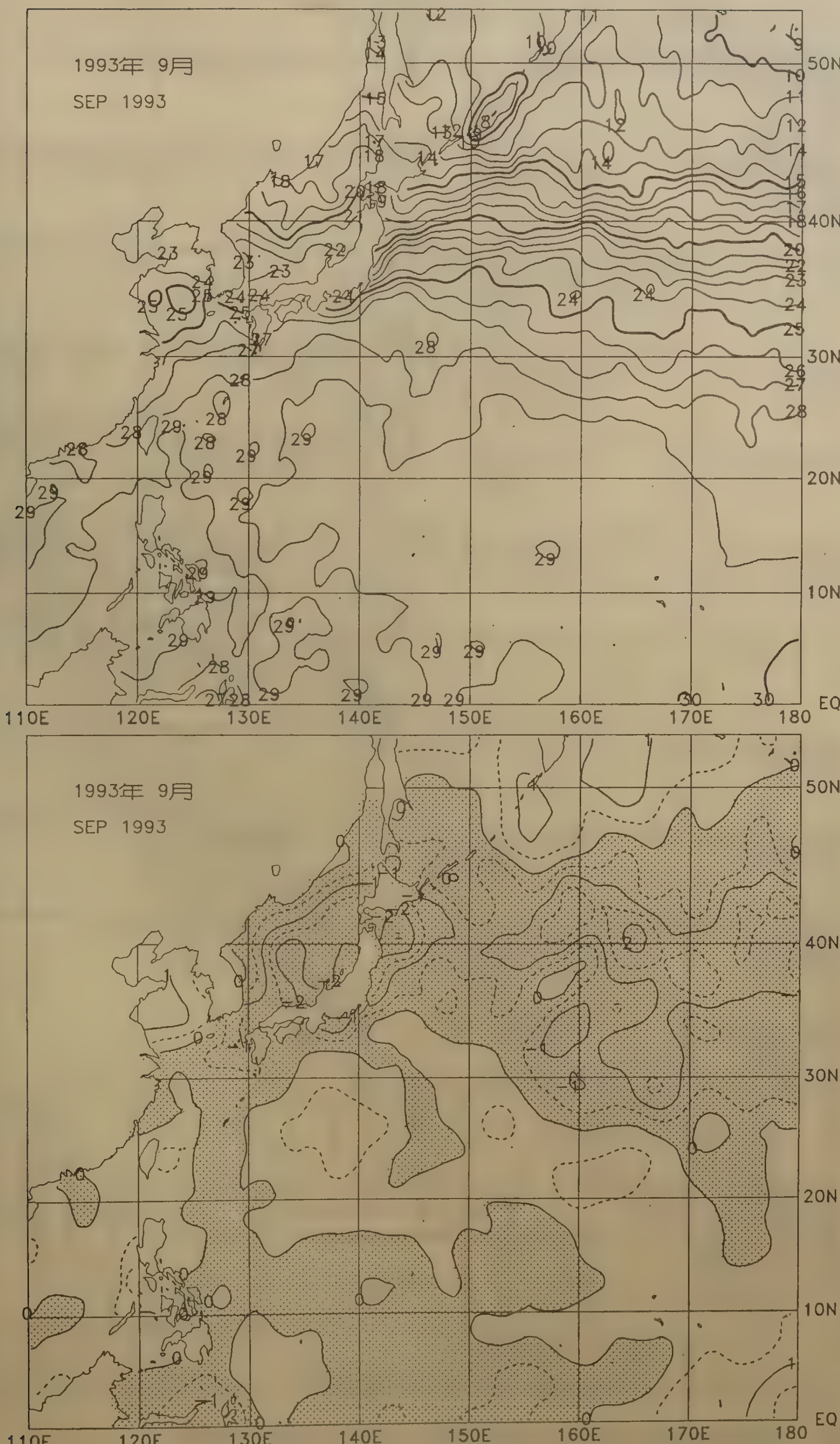
海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,145.4E	21.2
四国沖	29.0N,135.0E	28.5
東シナ海	28.2N,126.3E	27.8

第16図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 9月下旬)

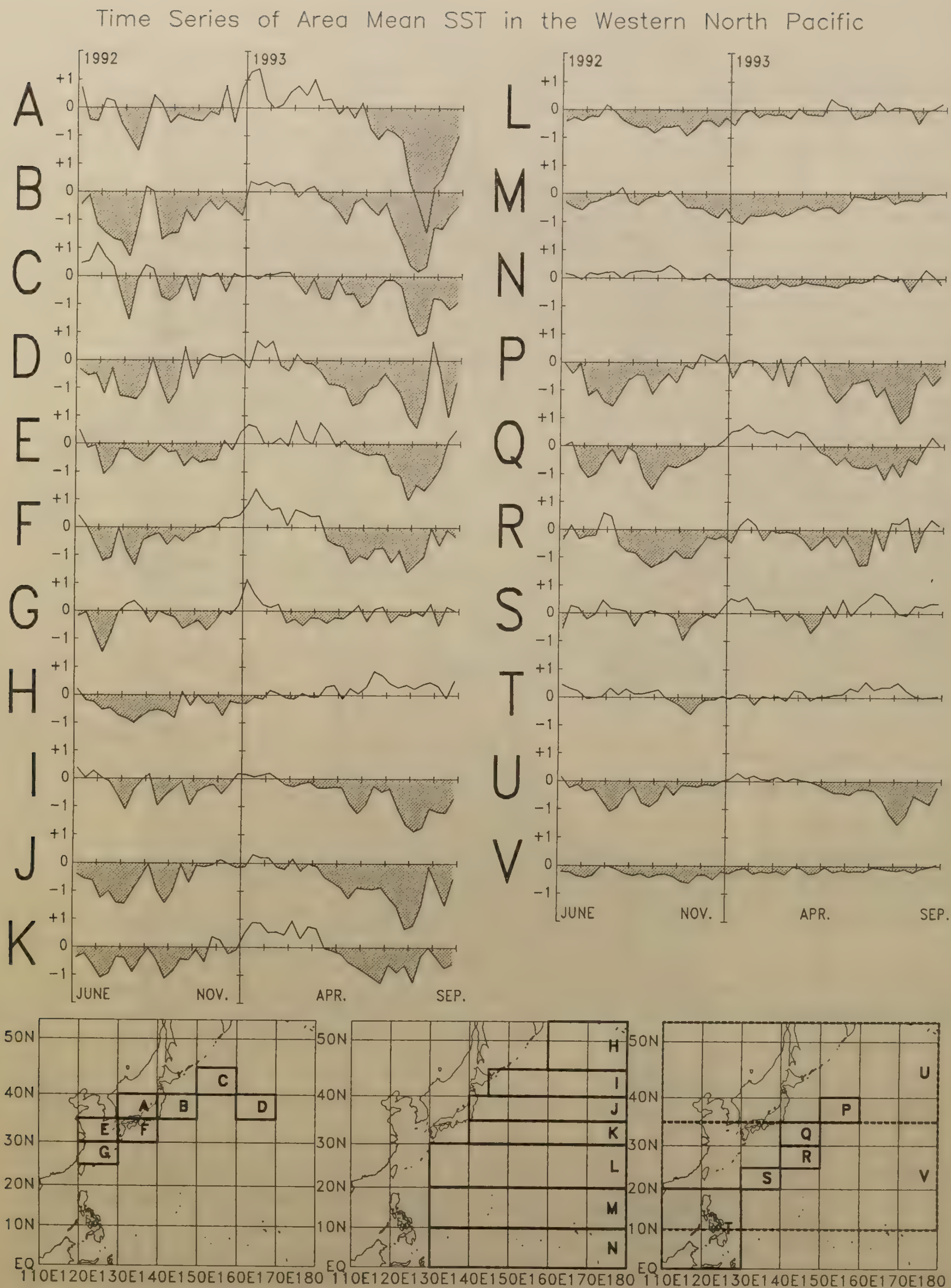
Fig.16 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 3rd ten-day period in SEP 1993. Anomalies are computed with respect to the JMA climatology (1961-90). The contour interval is 1°C and additional anomaly contours of 0.5°C are shown. Negative anomalies are stippled.

Monthly Mean SST & Anomalies



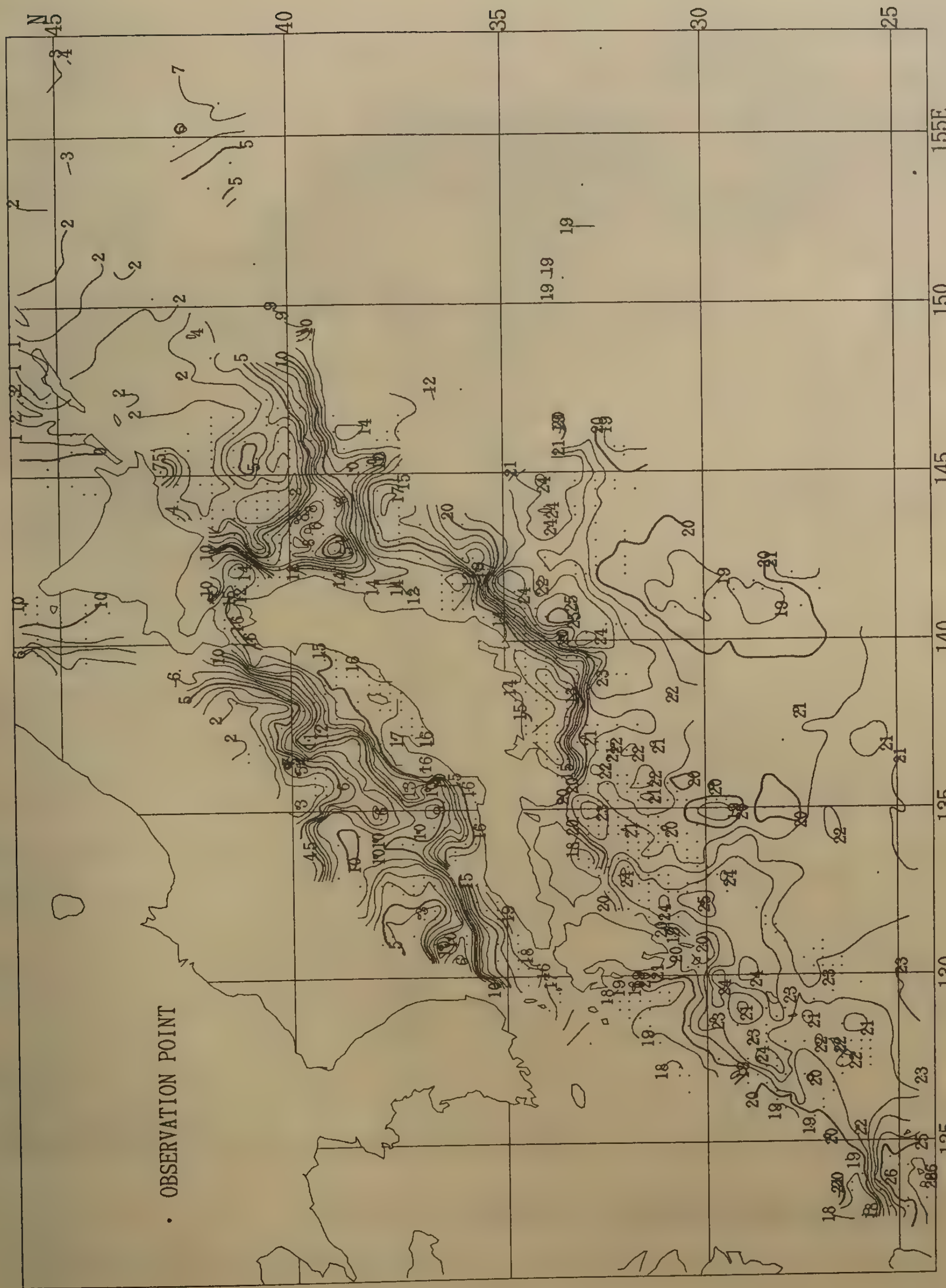
第17図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1993年 9月)

Fig.17 Monthly mean SSTs in the western North Pacific (top) and anomalies (bottom) for SEP 1993. Anomalies are computed with respect to the JMA climatology (1961-90). The contour interval is 1° C and additional anomaly contours of 0.5° C are shown. Negative anomalies are stippled.



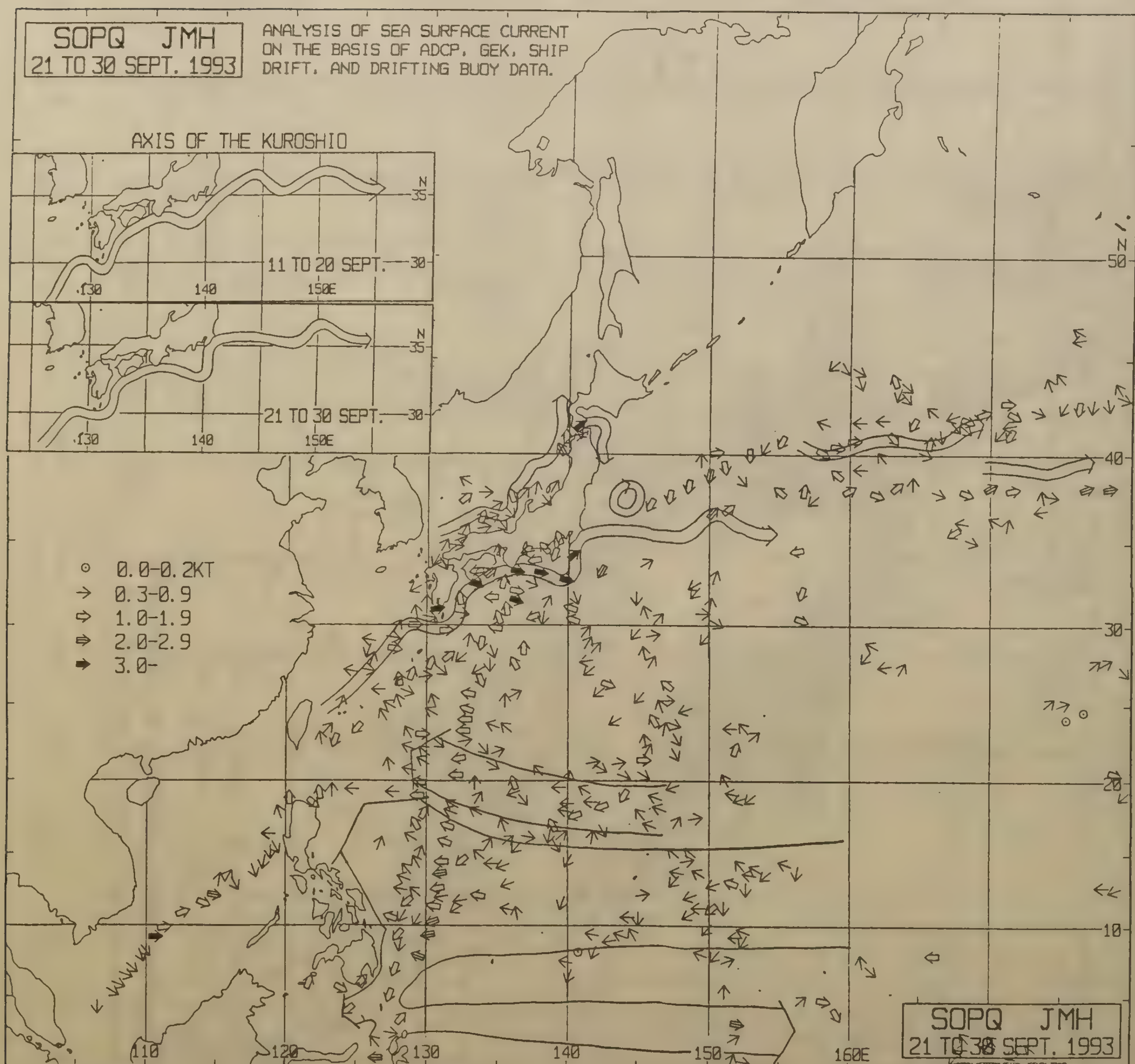
第18図　北西太平洋旬平均海面水温平年偏差時系列図

Fig.18 Time series of the ten−day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas indicated at the bottom. Negative anomalies are shaded. Anomalies are computed with respect to the JMA climatology (1961−90).



第19図 日本近海表層水温（深さ100M）図（1993年 9月）

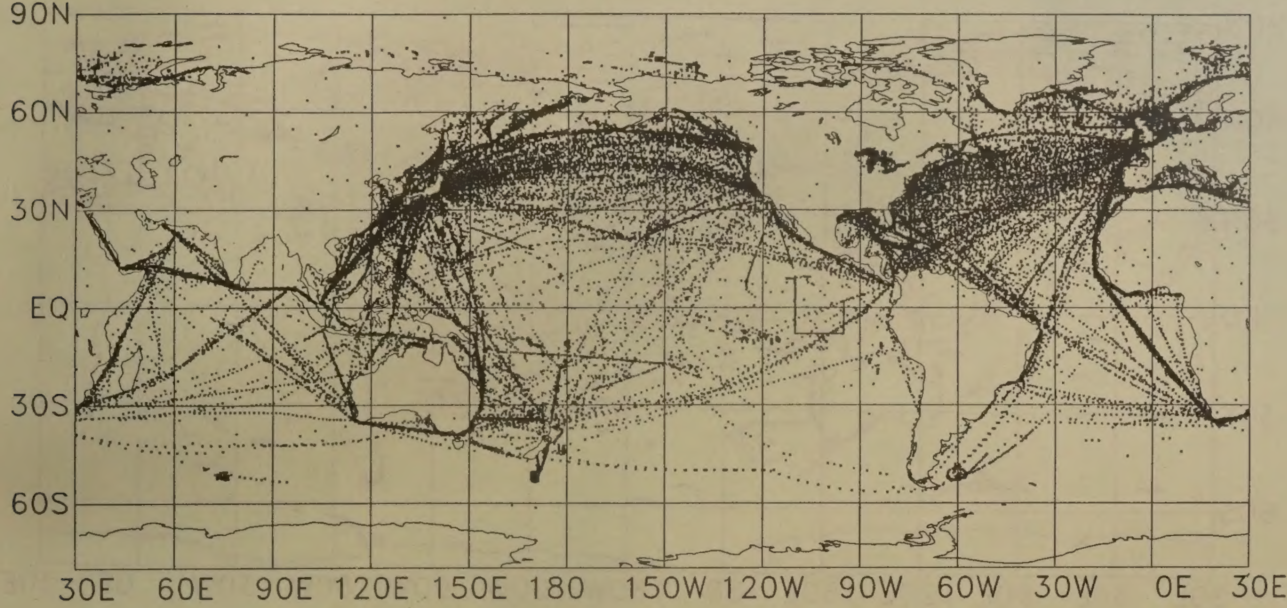
Fig.19 Subsurface (100m) temperatures in seas adjacent to Japan for SEP 1993.



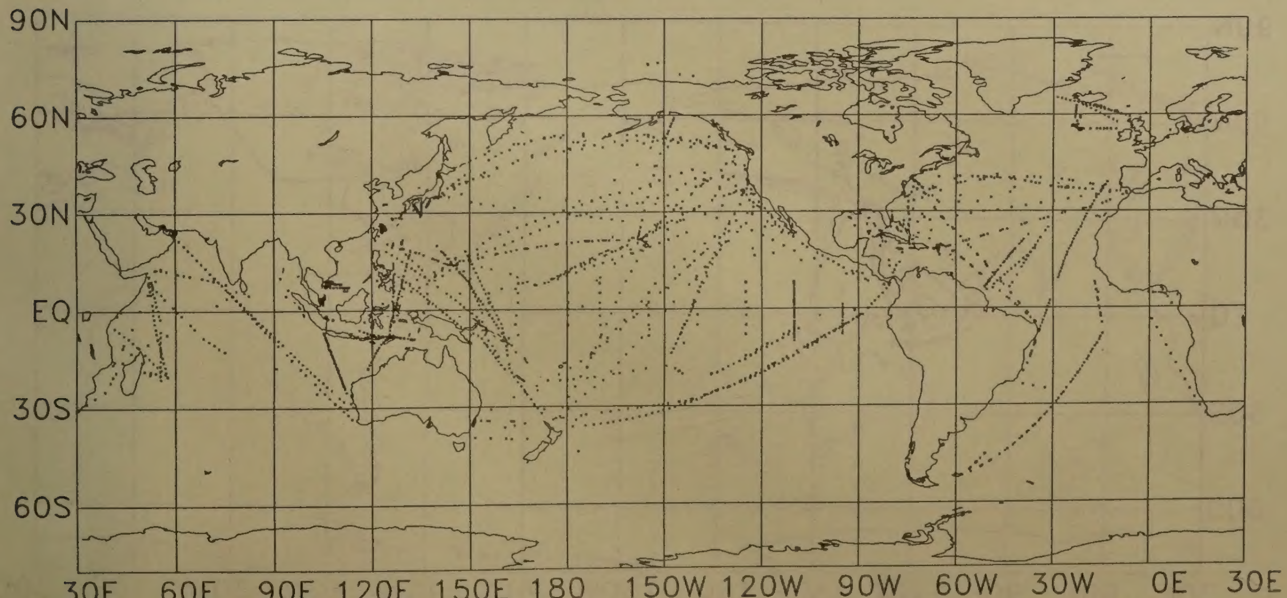
第20図　北西太平洋旬平均海流図（1993年 9月下旬）

Fig.20 Ten-day analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in SEP 1993. Small arrows indicate sea surface currents measured with acoustic Doppler current profilers, GEKs deployed in research vessels, and ship drift by merchant ships/drifting buoys during the month. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

Geographical Distribution of Oceanographic Data



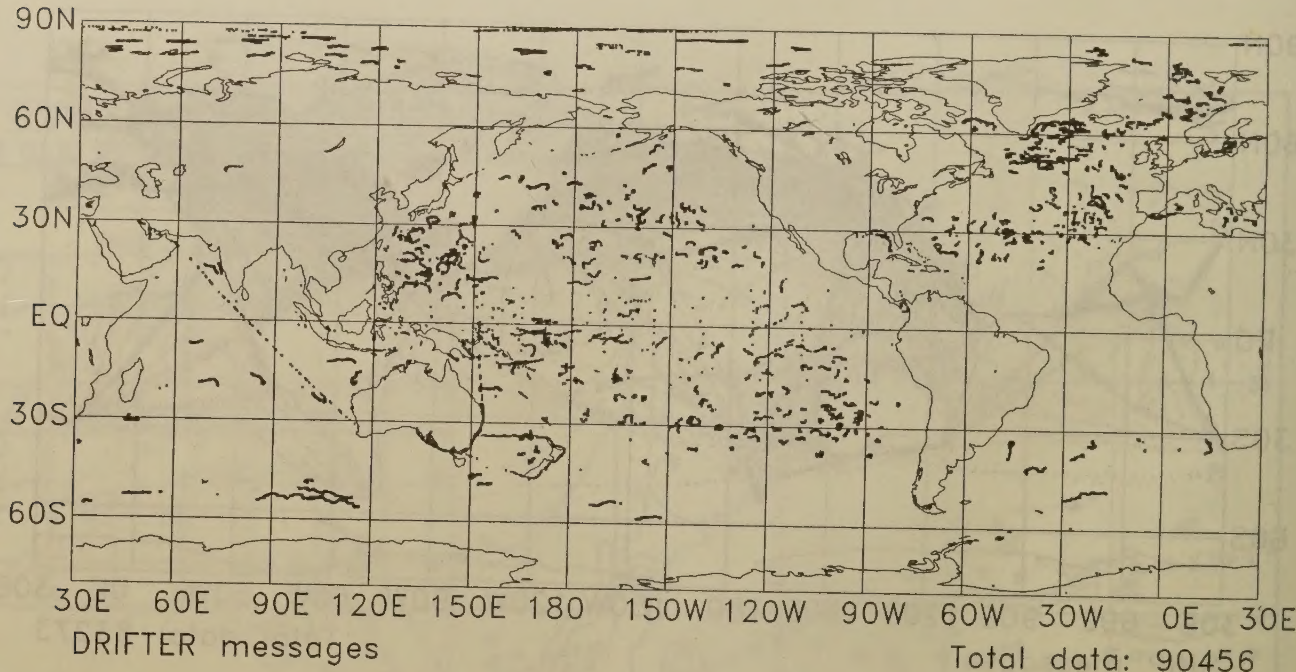
SHIP messages Total data: 83273

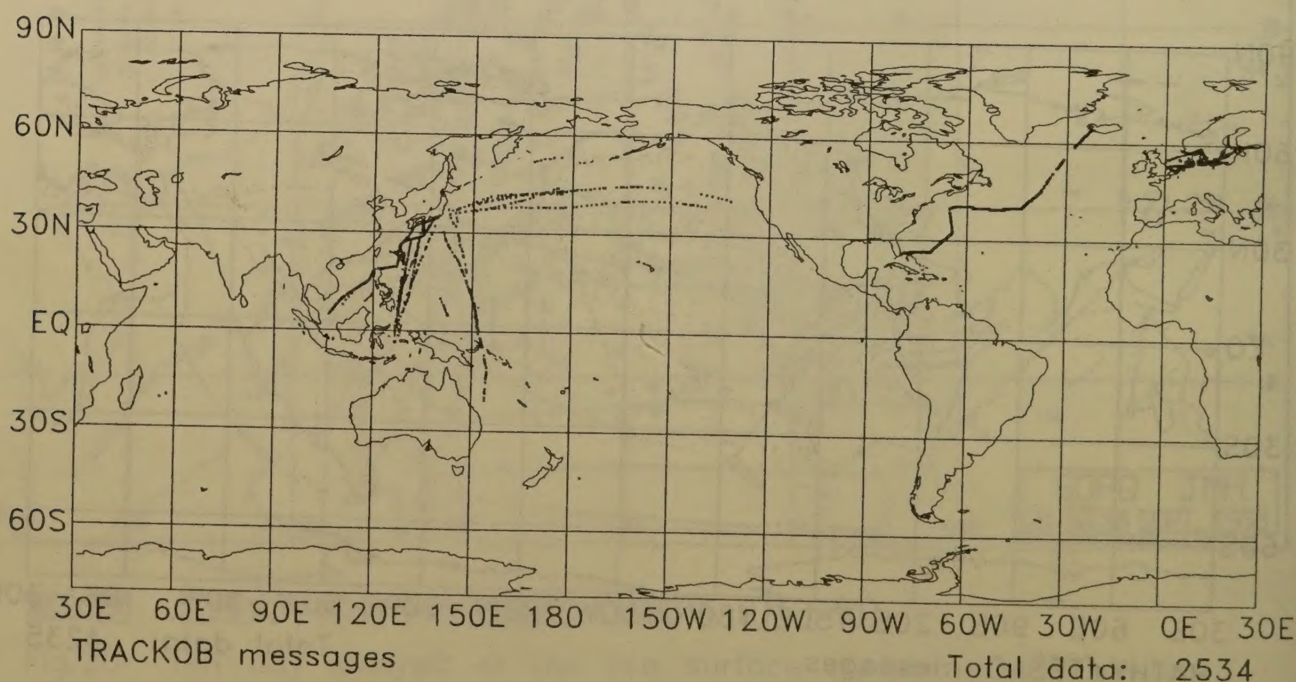


BATHY/TESAC messages Total data: 4235

第21-1図 測点分布図(1993年 9月)

Fig.21−1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for SEP 1993.





第21-2図 測点分布図(1993年 9月)

Fig.21-2 Geographical distribution of DRIFTER messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for SEP 1993.

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